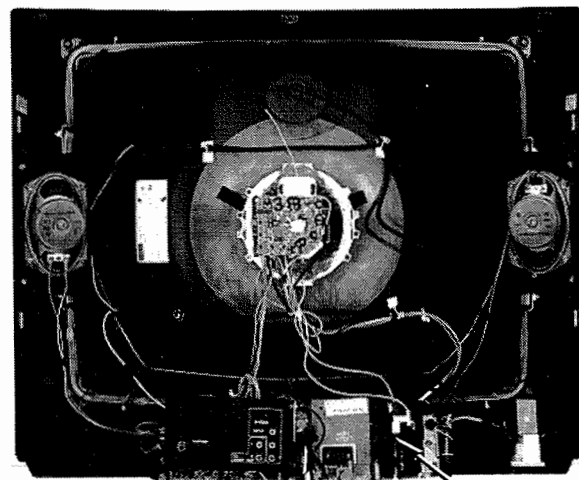




AC FUSE FOCUS
CABINET-REAR VIEW

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

Remove eight screws holding cabinet back and remove back. Disconnect HV anode, speaker connectors, CRT socket, deflection yoke connector, degaussing coil connector, ground leads and all required cabling. Release latch holding Main Board to cabinet bottom and slide assembly out from cabinet. Release 2 latches holding Remote receiver Assembly to cabinet front and remove assembly from cabinet. Release 4 latches holding Led Indicator Board to cabinet front and remove assembly from cabinet. Remove 5 screws holding keyboard to cabinet front and remove from cabinet.

CRT REMOVAL

Caution: Some sets employ a CRT with neck assemblies permanently bonded to CRT. **DO NOT** attempt to remove these assemblies. Follow "Chassis Removal" procedure and lay set facedown on a soft protective surface. Loosen and remove CRT neck assemblies. Remove four nuts holding CRT to cabinet front and lift CRT out of cabinet. **DO NOT** lift CRT by the neck.

SERVICING IN THE FIELD

CRT IMPLOSION PROTECTION AND CLEANING

Implosion protection is an integral part of the picture tube, cleaning accomplished without CRT removal.

FUSE DEVICES

A 4.0-amp fuse is used for AC line protection. (See photo, Cabinet - Rear View.)

LED ACCESSABILITY

LED Segment display is accessible after removing cabinet back.

Tuner assembly must be removed. See Disassembly Instructions.

CHANNEL TUNING

Channel Up and Down buttons are provided for channel scanning with ten numbered buttons (on remote transmitter) provided for one or two digit entry direct access channel selection.

HIGH VOLTAGE

For High Voltage procedure, refer to Miscellaneous Adjustments.

WIDTH

The horizontal width may be varied by adjusting the Horizontal Width Control. (See photo, Main Board - Top View.)

FOCUS

The focus may be varied by a Focus control. (See photo, Cabinet Rear View.)

RF-AGC

The AGC may be varied by an RF-AGC Control. (See photo, Main Board - Top View.)

CENTERING

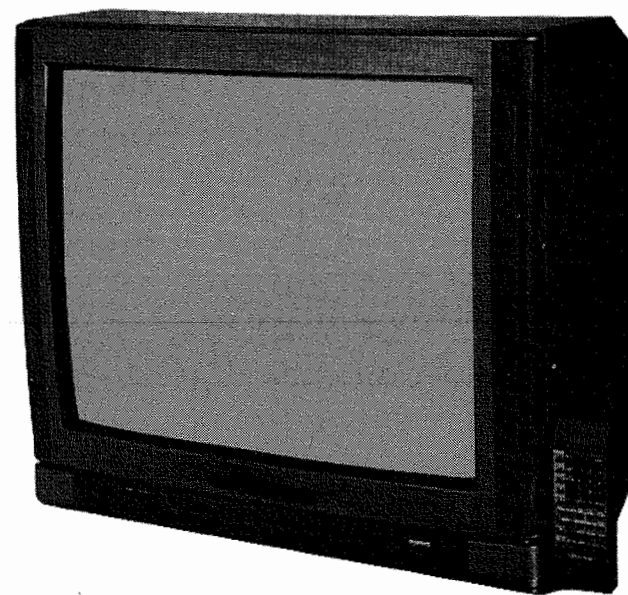
Horizontal centering is accomplished by proper adjustment of the horizontal centering control. (See photo chassis top view).

SET 2820 FOLDER 1
SAMS

PHOTOFACT®

PANASONIC
MODEL CTM-2770S (CHASSIS ALEDP182)

For Supplier Address See PHOTOFACT Index



MODEL CTM-2775S

MODEL CHASSIS
CTM-2770S ALEDP182
CTM-2771S AEDP182
CTM-2781S AMEDP182
CTM-2775S AEDP184
CTM-2776S AEDP184
CTM-2778S AEDP184

SAFETY PRECAUTIONS

See Page 1.

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The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co. as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co. by the manufacturers of the particular type of replacement part listed.

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DATE 4-91

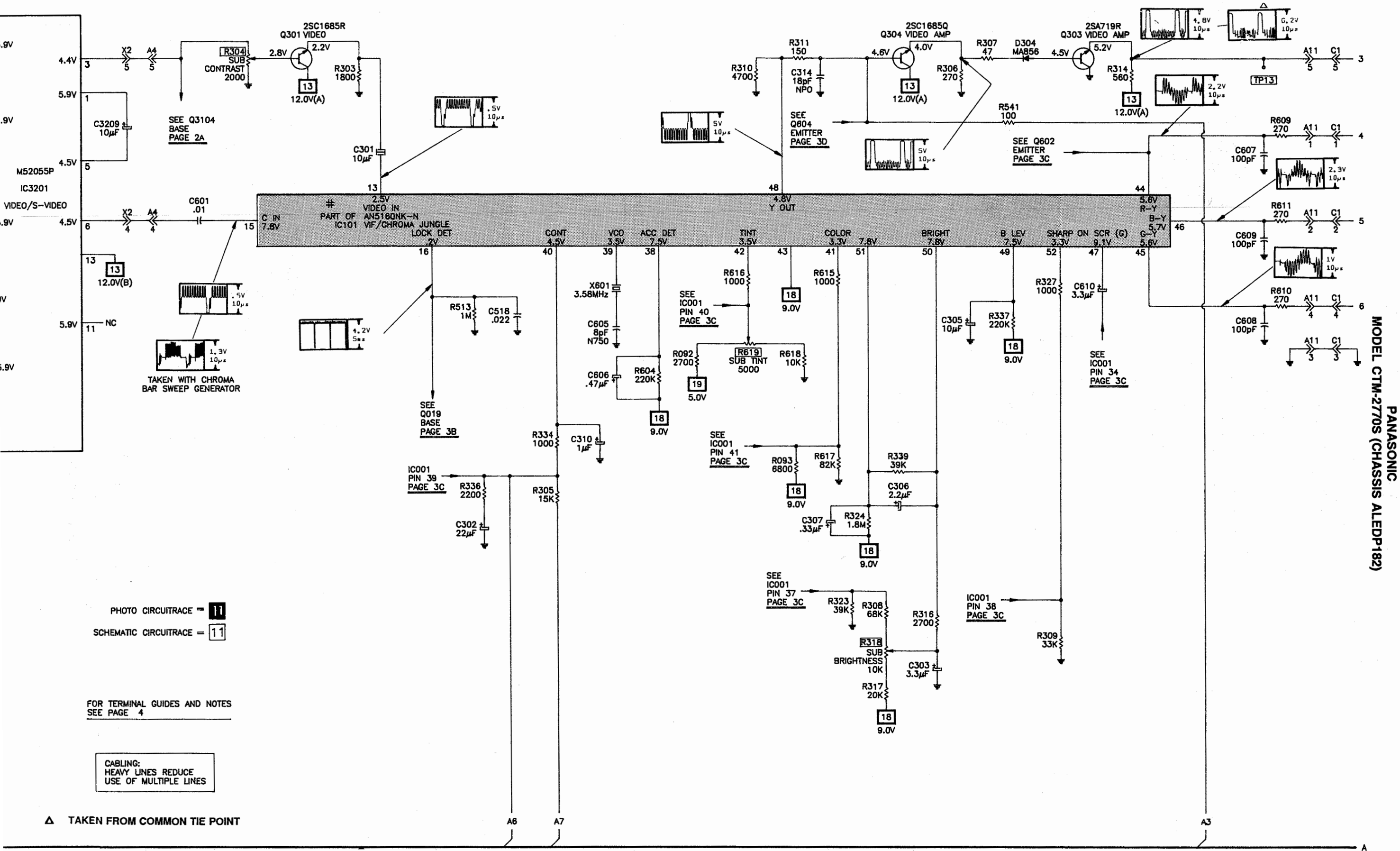
SET 2820 FOLDER 1



10 9 8 7 6 5 4 3 2 1 0

PANASONIC
MODEL CTM-2770S (CHASSIS ALEDP182)

SET 2820 FOLDER 1



PANASONIC
MODEL CTM-270S (CHASSIS ALEDP182)

TEST JIG HOOKUP

FUNCTION	Chek-a-Color ADAPTER NO.	PLUG # DY			
CRT YOKE YOKE SETTING COMMENTS	B239 D482 YP1A FOCUS TAP	PIN 1	PIN 2	PIN 4	PIN 6
		YELLOW	GRAY	BLUE	RED

TEST EQUIPMENT

Test equipment listed by manufacturer illustrates typical or equivalent equipment used by SAMS' engineers to obtain measurements and is compatible with most types used by field service technicians.

Equipment	B&K Precision No.	SENCORE No.
Oscilloscope	1541A, 2120, 2125, 2160, 2190, 2522	SC61
Generators		
RGB	1249A, 1260	RG67
Multiburst Signal	1251, 1260	VA62A
Color Bar	1211A, 1249A, 1251, 1260	VA62A, CG25, NT64
TV Stereo	2009	ST65, ST66
Analog VOM	114, 117, 177, 214	
Digital VOM	377, 388HD, 2700 Series, 2831A 2860, 2900 Series	DVM37, DVM56A, SC61
Frequency Meter	1803A, 1804A, 1805, 1822, 1851, 1855	FC71, SC61
Hi-Voltage Probe VOM/DMM Accessory probes	HV-44 PR-28(HV)	HP200 TP212
Isolation Transformer	TR110, 1604,1653,1655	PR57
Capacitance Analyzer	810A, 815, 820, 830	LC76, LC101, LC102
CRT Analyzer	480, 490	CR70
Temperature Probe	TP-28, TP-30	
AC Leakage Tester	1655	PR57
Logic Probe	DP21, DP51	
Logic Pulser	DP31, DP101	
Inductance Analyzer	875A	LC76, LC101, LC102
Flyback Yoke Tester	875A	VA62A, LC76, LC101, LC102
TV Stereo Power Monitor		SR68
Field Strength Meter		FS73, FS74
Transistor Tester	510, 520B, 530	TF46
Video Analyzer		VA62A
Modulator/Converter	1201	

TV ALIGNMENT INSTRUCTIONS

Use an isolation transformer, or observe polarity, and maintain line voltage at 120VAC. Allow a 20 minute warm-up period for receiver and test equipment. Suggested Alignment tools: GC-THORSEN	
Alignment COILS: L101,L105, L201	RECOMMENDED TOOLS: 9440

TV ALIGNMENT (Continued)

PRELIMINARY INSTRUCTIONS

Select highest unused channel. Set scope sweep to external or vector mode. Connect scope vertical input to scope vertical input on sweep/marker generator. Connect scope external horizontal input to scope horizontal input on sweep/marker generator. Ground test equipment to TV chassis unless specified otherwise. Use only enough generator output to provide a useable indication. Sweep Generator frequency is 44MHz with 10MHz Sweep. NOTE: Response may vary from that shown. Apply 2.4V to TP14
--

VIDEO IF ALIGNMENT (SWEEP MARKER GENERATOR)

DIRECT PROBE FROM SWEEP GENERATOR	SWEEP GENERATOR OUTPUT	MARKER GENERATOR FREQUENCY	REMARKS
TP121	TP135	45.75MHz	Adjust L105 to place marker as shown in Figure 1. See Figure 1.

VIDEO IF ALIGNMENT (BAR SWEEP GENERATOR)

BAR SWEEP GENERATOR	SCOPE INPUT	REMARKS
To Antenna	TP121	Perform Video IF adjustment per sweep/marker generator instructions. See Figure 2.

SOUND IF ALIGNMENT

Tune in a station and adjust L201 for maximum sound. Reduce signal strength at the antenna terminals until distortion appears. Continue to reduce the signal while aligning for undistorted output by adjusting L201.

AUTOMATIC FINE TUNING ALIGNMENT

Connect as explained in preliminary instructions unless specified otherwise.			
DIRECT PROBE FROM SWEEP GENERATOR	SWEEP GENERATOR OUTPUT	MARKER GENERATOR FREQUENCY	REMARKS
TP16	TP135	45.75MHz	Set 45.75MHz marker at crossover. See figure 3.

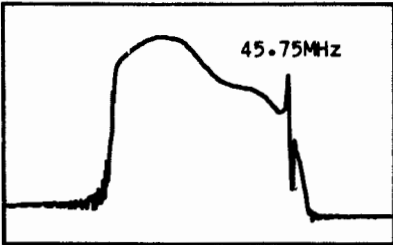


Figure 1

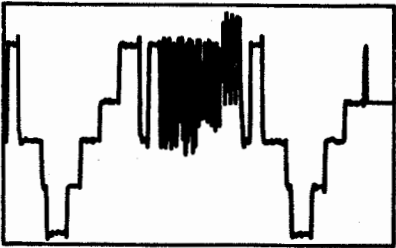


Figure 2

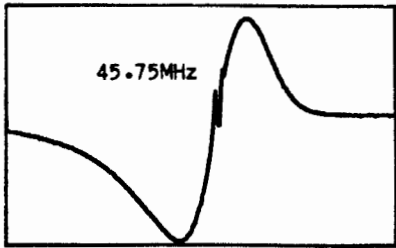


Figure 3

PANASONIC
MODEL CTM-2770S (CHASSIS ALEDP182)

SAFETY PRECAUTIONS**SERVICE WARNING**

Service work should be performed only by qualified service technicians who are familiar with safety checks and guide lines.

1. For continued safety, no modification of any circuit should be attempted unless recommended by manufacturer.
2. Disconnect power source before replacing parts as some parts may be electrostatic sensitive.
3. Use an isolation transformer between the line cord and power receptacle, when servicing chassis.

SERVICING HIGH VOLTAGE AND PICTURE TUBE

When servicing the High Voltage circuits, extreme caution should be used.

1. Discharge static High Voltage by connecting a 10 kohms resistor in series with a test lead between chassis and anode lead of picture tube.
2. Wear shatter-proof eye protection (goggles) when handling the picture tube in case of implosion.
3. DO NOT lift picture tube by the neck.

X-RAY RADIATION AND HIGH VOLTAGE LIMITS

Service personnel should be aware of the procedures and instructions covering x-ray radiation. The only potential source of x-ray in present day solid state receivers and monitors is the picture tube.

1. It is only when High Voltage is excessive that x-ray radiation is capable of being emitted from shell of picture tube. Be sure the High Voltage is set at specified level.
2. An accurate High Voltage meter should be available at all times. Meter calibration should be checked periodically.
3. High Voltage should be kept at rated value - NO HIGHER. Higher voltages may cause x-ray radiation or failure of other associated components. DO NOT depend on protection circuit to keep voltages at rated value.
4. Every time a chassis is serviced, High Voltage should be checked at various brightness levels to be sure it is regulating properly.
5. While troubleshooting a set with excessive High Voltage, avoid being close to picture tube. DO NOT operate longer than it is necessary to locate the cause of excessive High Voltage. Use a variable AC transformer to regulate voltage.
6. Many components, electrical and mechanical, in present chassis have safety related characteristics which are not evident with visual inspection. When these components are known, they are identified with a # on the schematic and in the parts list. When replacing these components, for SAFETY, use only an equivalent replacement part.

SAFETY CHECKS-FIRE AND SHOCK HAZARD**Cold Leakage Checks (Sets with isolated ground.)**

1. Unplug the AC cord and connect a jumper across the two prongs on the plug.
2. Turn on power switch.
3. Measure the resistance, with an Ohm meter, between the jumpered AC plug and any exposed metal cabinet parts on the set such as: antenna screw heads, control shafts, handle brackets. Exposed metal parts that have a return path should measure between 200 kohms and 5 megohm. Parts without a return path must measure infinity.

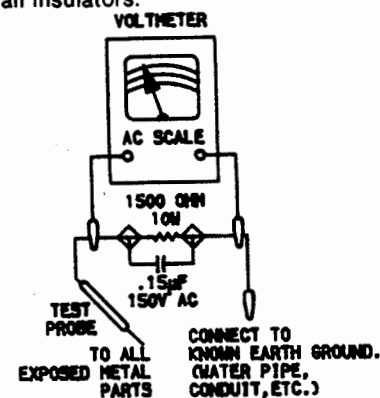
Leakage Current Hot Check

1. Plug the AC cord directly into AC outlet. DO NOT use an isolation transformer.
2. Connect a 1500 Ohm 10 watt resistor, in parallel with a .15 μ F 150V AC capacitor, between any exposed metal parts on the set and a good earth ground such as a water pipe. (See Figure below.)
3. Using an AC volt meter, with 1000 Ohms per volt or more sensitivity, measure the voltage across the resistor. Check each exposed part and measure voltage at each point.
4. Reverse the AC plug and repeat voltage measurement at each point.
5. The voltage at any point should not exceed .75 volts RMS. This corresponds to .5 milliamps AC. Any value exceeding this limit constitutes a potential shock hazard and must be corrected.

GENERAL GUIDE LINES

A final SAFETY check before returning the set to customer.

1. Check area repaired for poorly soldered or de-soldered connections. Check entire circuit board surface for solder splashes.
2. Check interboard wiring for pinched wires or wires contacting any high-wattage resistors.
3. Check that all control knobs, shields, covers, grounds and mounting hardware have been replaced. Be sure to replace all insulators.

**TROUBLESHOOTING AID**

Note: Waveforms taken with triggered scope, Keyed-Rainbow generator. Schematic voltages measured with digital meter, no signal. Controls adjusted for normal operation.

PICTURE OR SOUND

NO PIC, NO SOUND, NO RASTER: Check AC power supply and sources generated from Horizontal Output Transformer (T551). Refer to "Troubleshooting" Power Supply and Horizontal circuits.

NO PIC, NO SOUND, HAS RASTER: Check IF-AGC and source voltages from Horizontal Output Transformer (T551). Refer to "Troubleshooting" IF-AGC and Horizontal circuits.

NO PIC, HAS SOUND, NO RASTER: Check Horizontal Output Transformer (T551) sources and Video circuit. Refer to "Troubleshooting" Horizontal and Video circuits.

NO PIC, HAS SOUND, HAS RASTER: Refer to "Troubleshooting" Video circuit.

HAS PIC, NO SOUND: Refer to "Troubleshooting" Audio circuit.

OVERLOADED PICTURE: Refer to "Troubleshooting" IF-AGC circuit.

LOW OR EXCESSIVE BRIGHTNESS: Check Video and Luminance circuits. Refer to "Troubleshooting" Video circuit.

SWEEP

NO RASTER, HAS SOUND: Check HV rectifier, Part of Horizontal Output Transformer (T551). Refer to "Troubleshooting" Horizontal circuit.

NO RASTER, NO SOUND: Refer to "Troubleshooting" Horizontal circuit.

NO VERT DEFLECTION: Refer to "Troubleshooting" Vertical circuit.

POOR VERT LIN OR FOLDOVER: Refer to "Troubleshooting" Vertical circuit.

POOR HORIZ LIN OR FOLDOVER: Refer to "Troubleshooting" Horizontal circuit.

NARROW PICTURE: Refer to "Troubleshooting" Horizontal circuit.

VERT OFF FREQUENCY: Refer to "Troubleshooting" Vertical circuit.

HORIZ OFF FREQUENCY: Refer to "Troubleshooting" Horizontal circuit.

SYNC

NO VERT/HORIZ SYNC: Refer to "Troubleshooting" Sync circuit.

RASTER

YELLOW (NO BLUE): Check Chroma and Blue Output circuits. Refer to "Troubleshooting" Raster circuit.

CYAN (NO RED): Check Chroma and Red Output circuits. Refer to "Troubleshooting" Raster circuit.

MAGENTA (NO GREEN): Check Chroma and Green Output circuits. Refer to "Troubleshooting" Raster circuit.

COLOR (B/W operating normally)

NO COLOR: Refer to "Troubleshooting" Chroma circuit.

WEAK COLOR: Refer to "Troubleshooting" Chroma circuit.

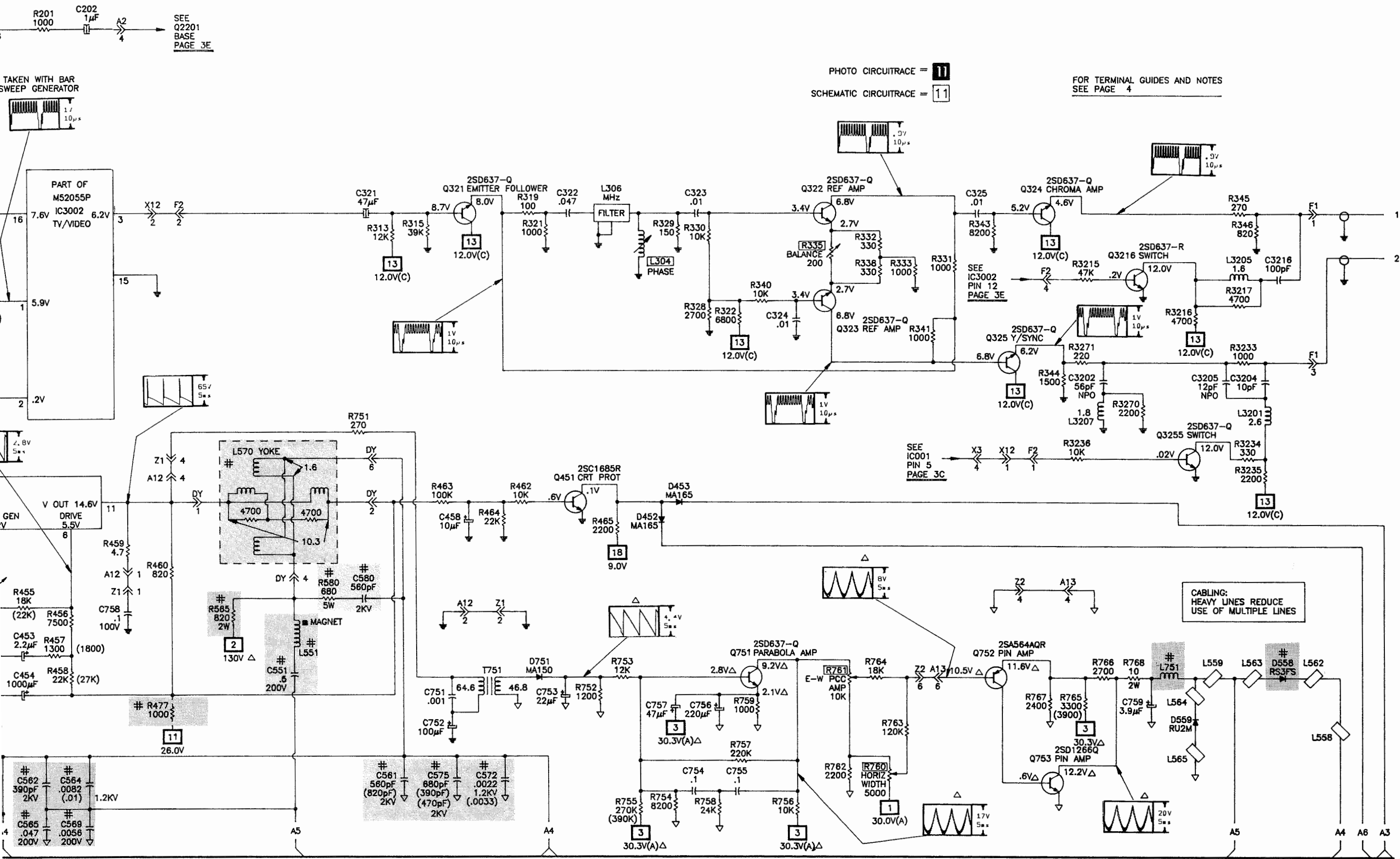
NO COLOR SYNC: Refer to "Troubleshooting" Chroma circuit.

NO GREEN: Check Chroma and Green Output circuits. Refer to "Troubleshooting" Raster circuit.

NO BLUE: Check Chroma and Blue Output circuits. Refer to "Troubleshooting" Raster circuit.

NO RED: Check Chroma and Red Output circuits. Refer to "Troubleshooting" Raster circuit.

INCORRECT HUE (TINT): Refer to "Troubleshooting" Chroma circuit.



TROUBLESHOOTING

POWER SUPPLY

Check the AC Fuse F001. If Fuse F001 is open, check Power Supply Transformer (T001), Audio Power Transformer (T2401), Bridge Rectifiers (D801 thru D804), Capacitors C802 thru C804 and Electrolytic C805. Apply 120V AC and check for 158V* at the cathode of Diode D802. If 158V* is missing at the cathode of D802, check Line Filter L801, Relay Drive Transistor (Q007) and Power Relay (RL001). If 158V* is present at the cathode of D802, check for 130V* at TP91. If the voltage is missing at TP91. If this voltage is missing, check voltages and components associated with 130V Regulator IC801. Check for 19.7V at the cathode of Bridge Rectifier (D2401). If 19.7V is missing, check Bridge Rectifiers (D2401 thru D2404), Capacitors (C2402,C2403, C2406, C2410), Electrolytics (C2405, C2313) and Tranfomer T2401. Check for 13.0V at the cathode of Diode (D031). If 13.0V is missing check tranformer T001, Diode D031, Capacitor (C2406) and Electrotyics (C2405, C2313). If the proper voltage is present at TP91, refer to the "Horizontal" section of this Troubleshooting guide.

* With respect to isolated ground.

AUDIO

Select an active TV channel and check for an audio waveform at pin 28 of VIF/CHROMA IC(IC101). If there is no audio, check the voltages, waveforms and components associated with pins 25, 28, 29, 30 of IC101. If waveform is present at pin 28 of IC101, select a station transmitting a signal in stereo and check for an audio waveform at pins 17 and 18 of the Multi-Sound Decoder IC(IC2200). If waveforms are missing check voltages and components associated with IC2200. Select a station transmitting a SAP signal and check for an audio waveform at pins 17 and 18 of the Multi-Sound Decoder IC(IC2200). If audio is present at pins 17 and 18 of IC2200 in Mono,Stereo and Sap modes, check for audio at pins 3 and 10 of the Balance/Bass/Treble/Volcontrol IC (IC2101). If audio is missing check the voltages, waveform and components associated with pins 5, 6, 8, 9, 11, 14 of TV/VIDEO switch IC(IC3002) and IC2101. If audio is present at pins 3 and 10 of IC2101, check the voltages, waveforms and components associated with the power amp IC (IC2301). Check the voltage at pin 12 of IC2101 it should measure 0.1V at mute and 10.5V at maximum volume.

VIDEO

Inject a video signal at TP121 and check for video on the CRT. If video is present, refer to the "IF-AGC" section of this Troubleshooting guide. If there is no video on the CRT, check for a video waveform at the emitter of Emitter Follwer Transistor (Q321). If video is missing at emitter of Q321, check the voltages, waveforms and components associated with pins 1, 2, 3, 15, 16 of TV/VIDEO IC(IC3002), Video Transistor (Q102), pin 21 of VIF/CHROMA IC (IC101) and Q321. If video is present at the emitter of Q321, check for a video waveform at pin 13 of IC101. If the waveform is missing, check the voltages, waveforms and components associated with VIDEO/S-VIDEO IC (IC3201),Video Transistor (Q301), Ref Amp Transistors (Q322, Q323) and Y-Sync Transistor (Q325). If the waveform is present at pin 13 of IC101, check the voltages, waveforms and components associated with pin 40, 48 thru 50 of IC101 and Video Amp Transistors (Q303, Q304). If the brightness is inadequate or cannot be controlled, check the voltages, waveforms and components associated with pin 50 of IC101.

IF-AGC

Inject a video IF signal at the IF input and check for video on the CRT. If video is present, check the Tuner, Tuner Control and Tuner AFC circuits. If there is no video on the CRT, check for a video waveform at TP121. If video is present at TP121, refer to the "Video" section of this Troubleshooting guide. If there is no video at TP121, apply AGC bias to TP14. If video is now present at TP121, check the voltages, waveforms and components associated with pins 31, 32 and 33 of the VIF/Chroma Jungle IC (IC101). If there is still no video at TP121, check the voltages, waveforms and components associated with pins 17, 18, 19, 21 thru 24, 26, 27, 31 thru 37 of IC101. A defective AGC circuit can cause an overloaded picture, excessive snow or loss of audio and video. See the AGC Voltage Chart for AGC voltages with signal.

AGC VOLTAGE CHART

IC101	
Pin 31	2.7V
Pin 32	4.7V
Pin 33	7.7V

CHROMA

Check for a chroma waveform at pin 15 of the VIF/CHROMA IC (IC101). If the voltage,waveforms and components associated with Chroma Amp Transistor (Q324)

TROUBLESHOOTING (CONTINUED)

and pins 6,8,9, of VIDEO/S-VIDEO IC (IC3201). If a chroma waveform is present at pin 15 of IC701, check for the proper waveforms at pins 44, 45, 46 of IC101. If these waveforms are missing, check the voltages, waveforms and components associated with pins 38, 39, 41 thru 47 of IC101. Check the 3.58MHz oscillator at pin 39 of IC101. Check the voltages and components associated with pin 40 of IC101. If there is inadequate tint range, check the voltages, and components associated with the sub-tint control and pin 42 of IC101. If the proper waveforms are present at pins 44, 45, 46 of IC101, refer to the "Raster" section of this Troubleshooting guide.

HORIZONTAL

Determine if the TV is in shutdown, refer to the "Horizontal Oscillator Disable" section of this Troubleshooting guide. If the TV is not in shutdown, inject a horizontal signal at the base of the Horizontal Output Transistor (Q551). If horizontal deflection is now present, check the voltages, waveforms and components associated with Horizontal Driver Transistor (Q501) and pins 4 thru 10 of VIF/Chroma Jungle IC(IC101) If there is still no horizontal deflection, check the voltages, waveforms and components associated with Q551 and Horizontal Output Transformer (T551). Check Rectifier Diodes (D541, D552 and D554) and associated components for defects. The high voltage rectifier is part of Transformer (T551) and if defective will affect the performance of the horizontal circuits. If the Horizontal Oscillator is off frequency, check the voltages, and components associated with pin 6, 7 of IC101. Horizontal linearity or width problems may be caused by Capacitors C551, C561, C562, C564, C565, C569, C572, C575, C580 and linearity coil (L551) being defective.

HORIZONTAL OSCILLATOR DISABLE

The high voltage is monitored by Diode D531, rectifying pulses from the Horizontal Output Transformer (T551). Should the high voltage increase, the rectified voltage at the cathode of Diode D531 will also increase and turn on X-Ray Protect Transistors (Q454, Q531, Q532, Q533). This causes the horizontal oscillator frequency to increase which lowers the high voltages. To troubleshoot, remove diode D531. Use a variable AC power supply to supply 90VAC and turn on the set. Slowly increase AC voltage and check for 130V* at TP91. If voltage id high refer to "Power Supply" section of this troubleshooting guide. If 130V* is present at TP91, check voltages waveforms and components associated with Flyback Transformer (T551), transistors Q454, Q531, Q532, Q533 and pin 7 of VIF/CHROMA/JUNGLE IC (IC101). NOTE: Care should be taken in defeating the high voltage shutdown circuit, asthis may cause exessive X-radiation and damage to the CRT, Transformer T551 and associated components. Monitor the high voltage and troubleshoot.

Voltages Taken with TV in Shutdown
IC101
PIN 7 .6V

HORIZONTAL OSCILLATOR DISABLE TEST

Connect the positive lead of a voltmeter to TPD2 and the negative lead to TPD1. Apply 120VAC and turn on set. Normalize Video menu and adjust Brite to zero. Adjust picture for .9V on voltmeter. Turn set off and place jumper between pins 1 and 4 of 130V Regulator IC (IC801). Use a variable AC power supply to supply 90VAC to the set. Turn on set and slowly increase at AC voltage while monitoring high vlotage with a high voltage probe. The high voltage should not exceed 34.8KV and the set should loose horizontal sync. If the high voltage exceed 34.8KV or the set fails to loose horizontal sync, refer to the "HORIZONTAL OSCILLATOR DISABLE" section of this troubleshooting guide.

VERTICAL

Inject a vertical signal at pin 2 of the VIF/Chroma Jungle IC (IC101). If vertical deflection is present, check voltages, waveforms and components associated with pins 2, 12, 14 of IC101. If there is still no vertical deflection, check the voltages, waveforms and components associated with the Vertical Output IC (IC451) and CRT Protect Transistor (Q451). Vertical linearity or height problems may be caused by vertical feedback and bias circuits, check Electrolytics C451 thru C455 and C457 for defects.

SYNC

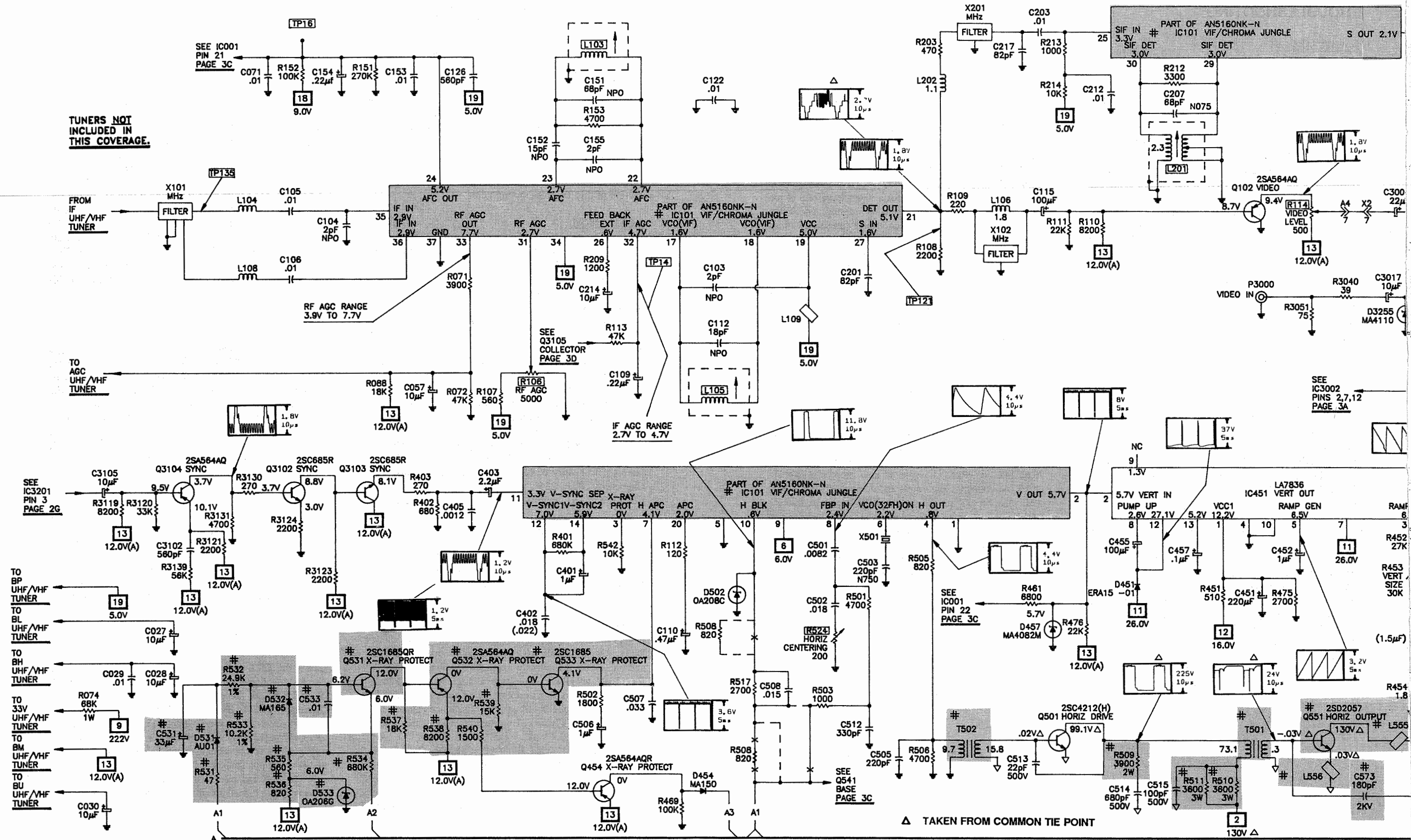
If there is no vertical or horizontal sync, check the voltages, waveforms and components associated with Sync Transistors (Q3102 thru Q3104). If there is no vertical sync, check the voltages, waveforms and components associated with pins 2, 12, 14 of VIF/CHROMA IC (IC101). If there is no horizontal sync, check the voltages, waveforms and components associated with pins 4, 6, 8, 10 of IC101.

RASTER

Check the CRT and CRT voltages. If there is no Red, check the voltages and components associated with pin 44 of VIF/Chroma Jungle IC (IC101) and Red Output Transistor (Q351). If there is no Green, check the voltages and components associated with pin 45 of IC101 and Green Output Transistor (Q352). If there is no Blue, check the voltages and components associated with pin 46 of IC101 and Blue Output Transistor (Q353). If the raster has height or width problems, refer to the "Vertical", "Horizontal" and "Power Supply" sections of this troubleshooting guide.

A

B



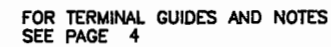
A PHOTOFACIT STANDARD NOTATION SCHEMATIC

WITH CIRCUITRACER

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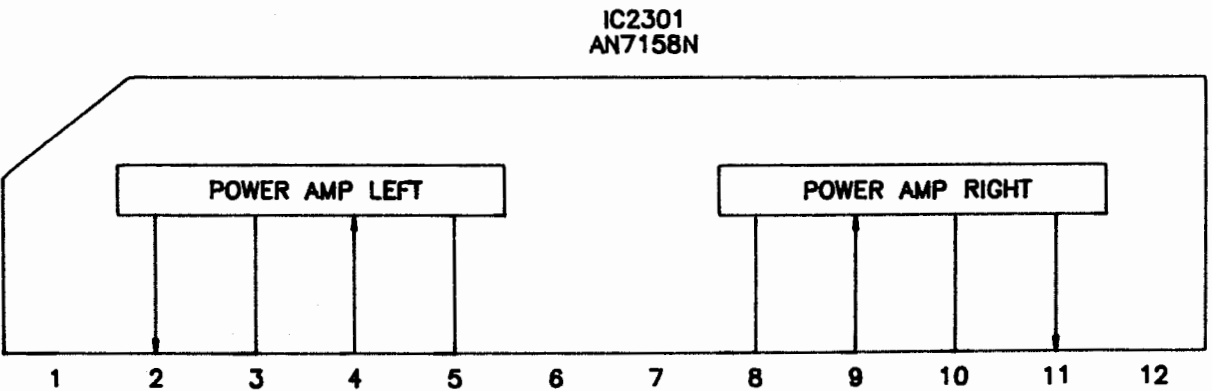
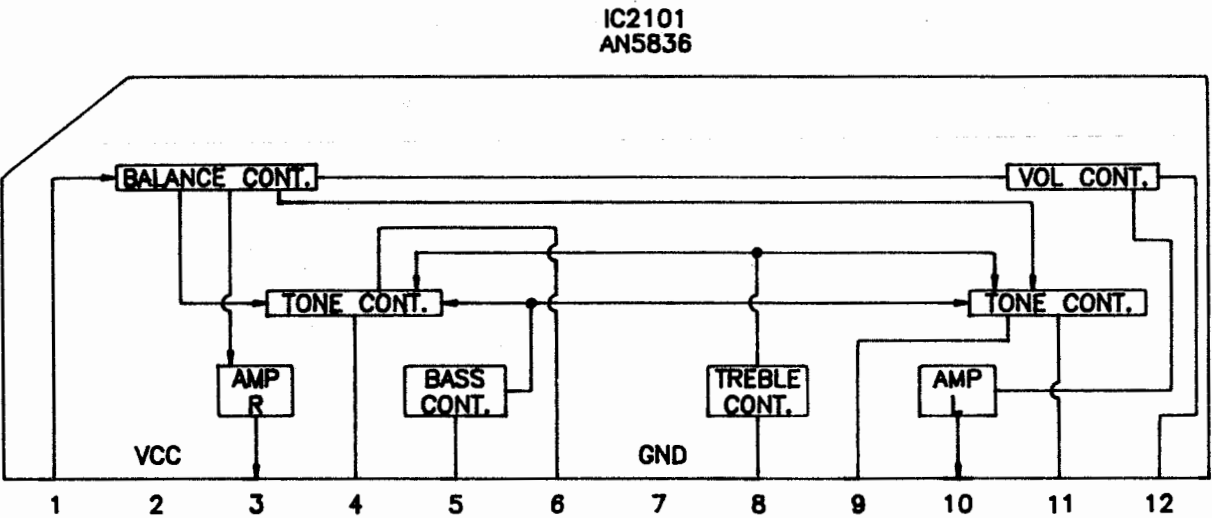
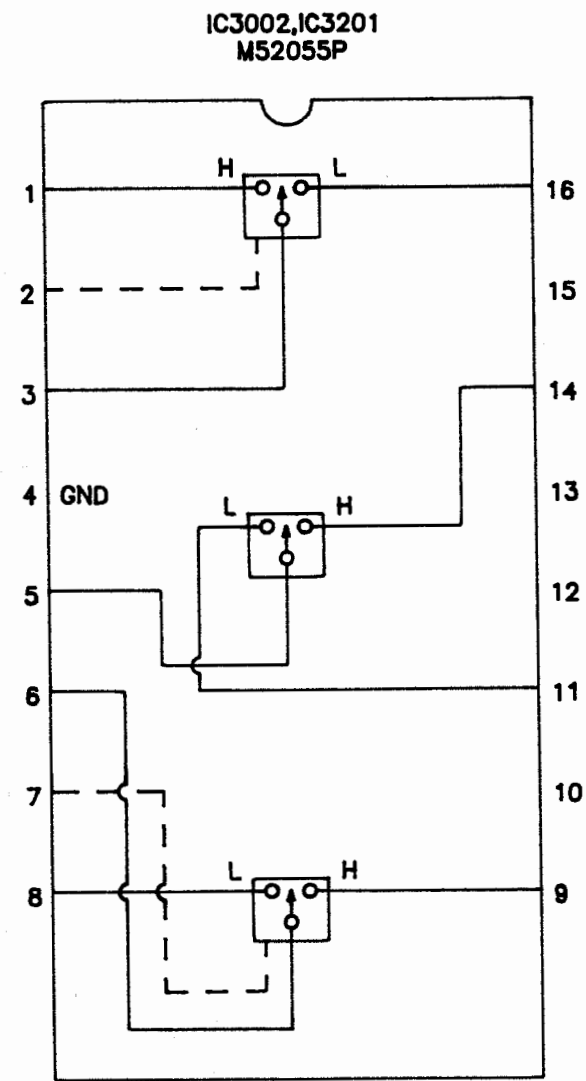
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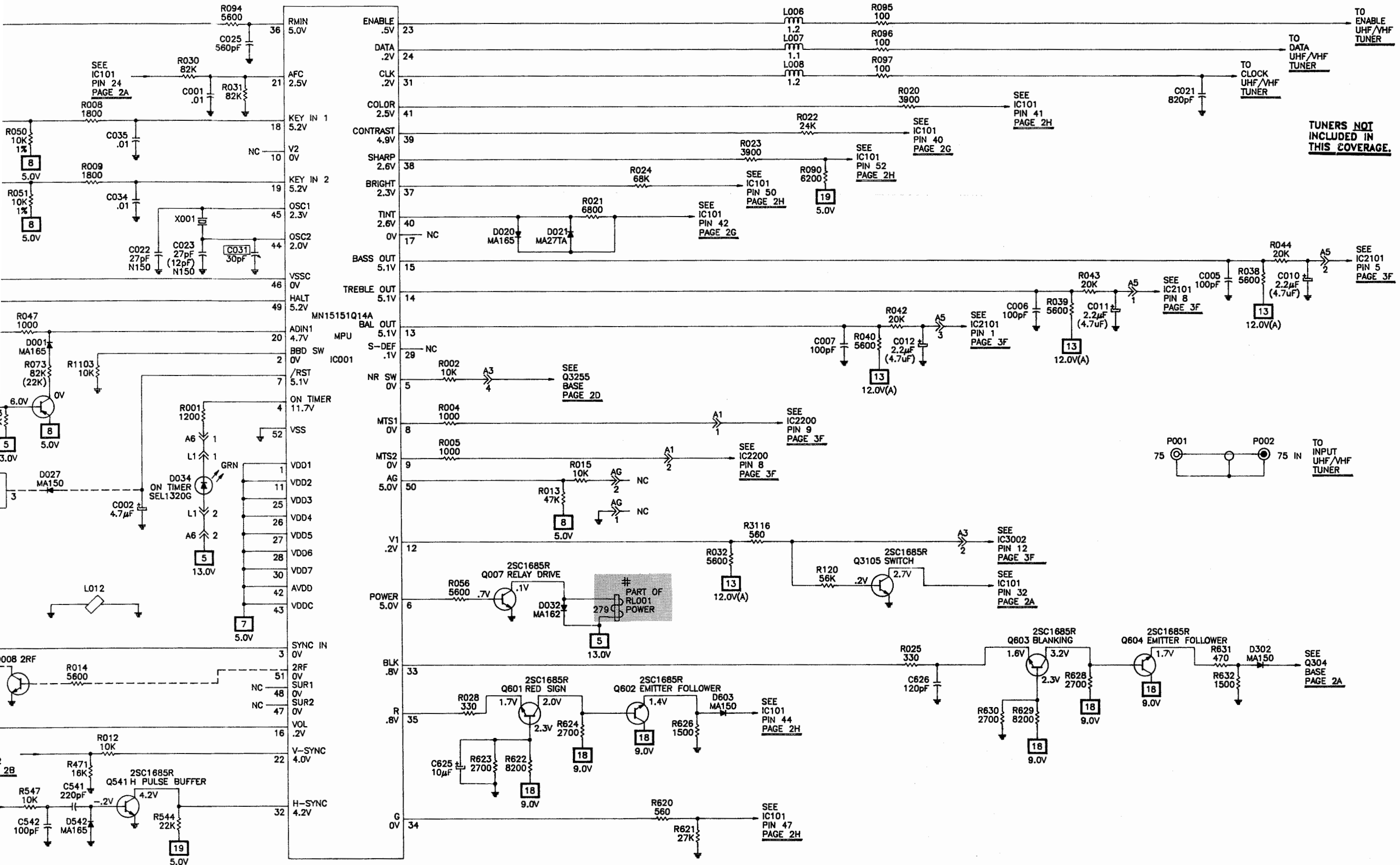


A PHOTOFACT STANDARD NOTATION SCHEMATIC

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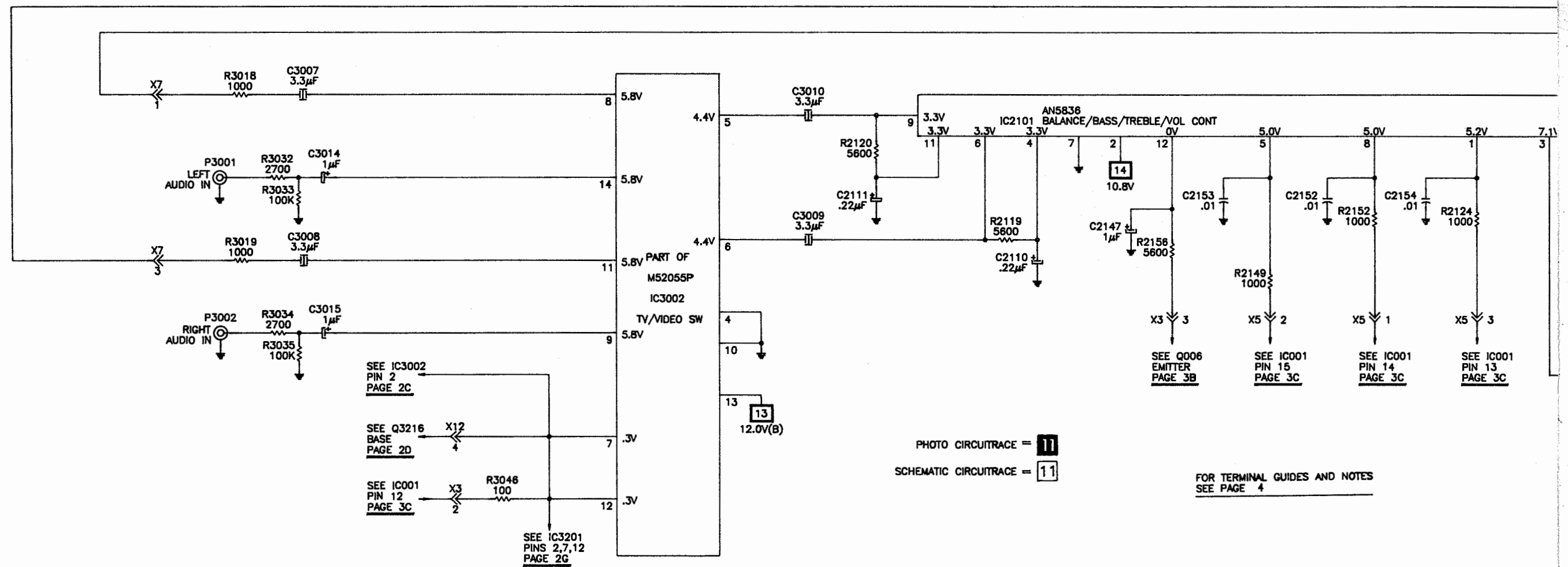
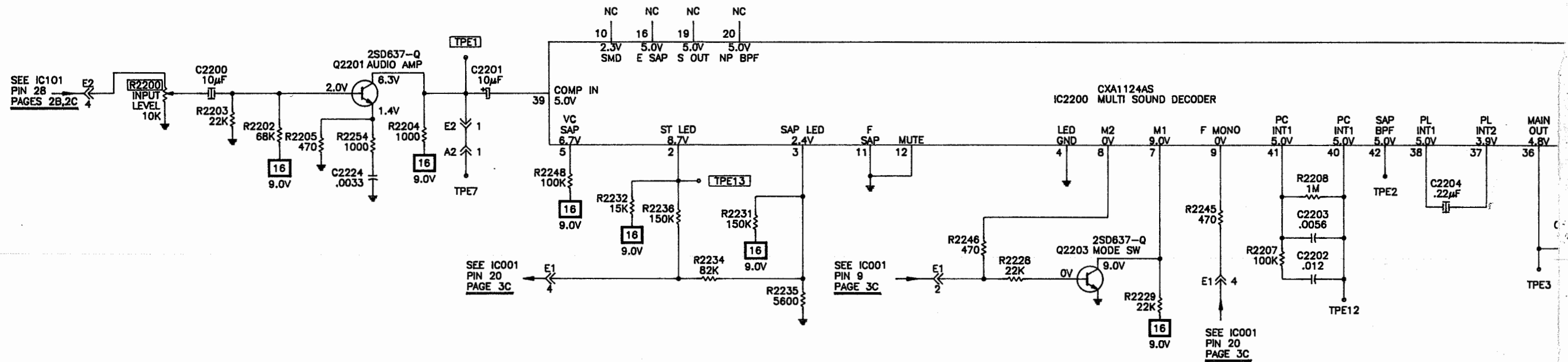




MPU



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STEREO/SAP ADJUSTMENTS

All adjustments were made using a B&K model 2009 MTS TV/STEREO generator connected to the antenna terminals, (equivalent generator may be used) with the customer controls set to normal listening levels. Select STEREO mode.

INPUT LEVEL ADJUSTMENT

On generator select PILOT, 1kHz audio frequency, and L-R modulating signal. Connect an oscilloscope to TPE1, low side to ground. Adjust Input Level control (R2200) for 900mVP-P.

L-R LEVEL ADJUSTMENT

On generator select PILOT, 1kHz audio frequency, and L-R modulating signal. Connect an oscilloscope to TPE11, low side to ground. Adjust L-R Level Control (R2209) for 600mVP-P

VCO ADJUSTMENT

On generator select PILOT, 1kHz audio frequency, and L-R modulating signal. Set volume control for an audible signal (about 15). Set VCO Control (R2200) fully Counterclockwise. Adjust VCO Control Clockwise until a clear signal is heard

FILTER ADJUSTMENT

Select SAP mode on receiver. On generator select SAP, 1kHz audio frequency, and L-R modulating signal. Connect an oscilloscope to TPE21 (IC2200, pin 21), low side to ground. Adjust Filter Control (R2221) for MINIMUM.

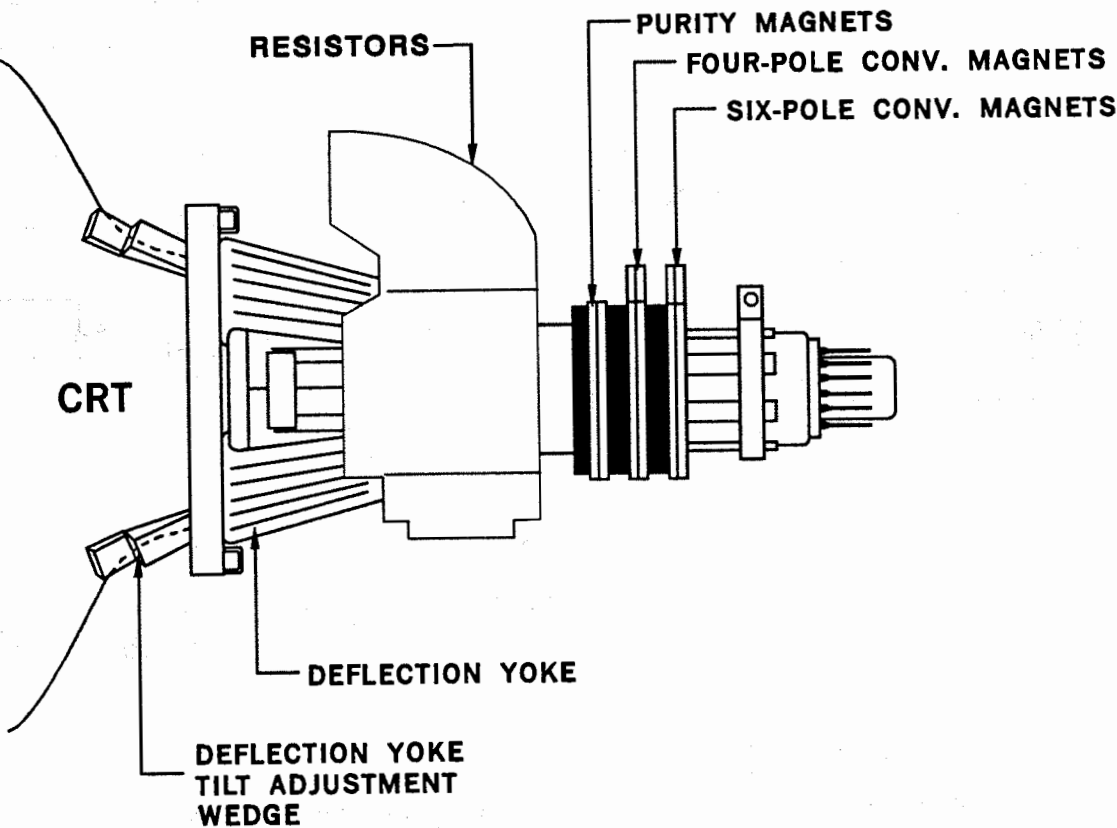
SEPARATION ADJUSTMENT

On generator select PILOT, 8kHz audio frequency, and Left modulating signal. Connect an oscilloscope to TPE10, low side to ground. Adjust Separation Control (R2213) for MINIMUM amplitude of waveform.

TUNER VOLTAGE CHART

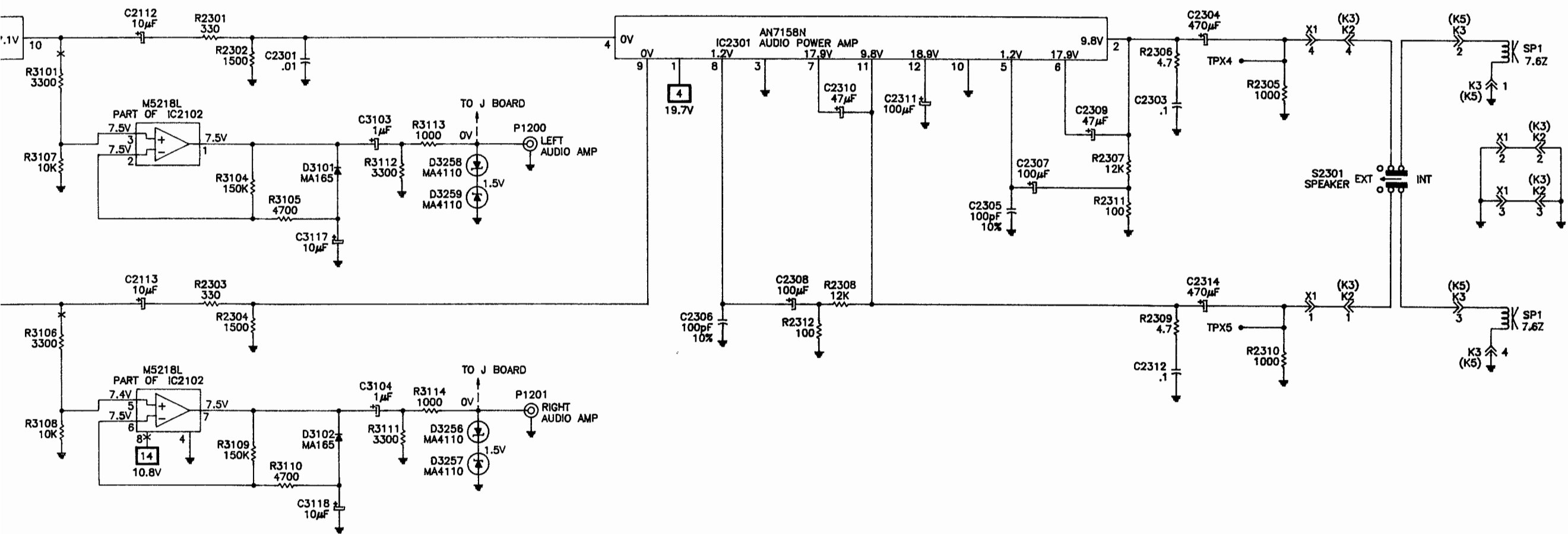
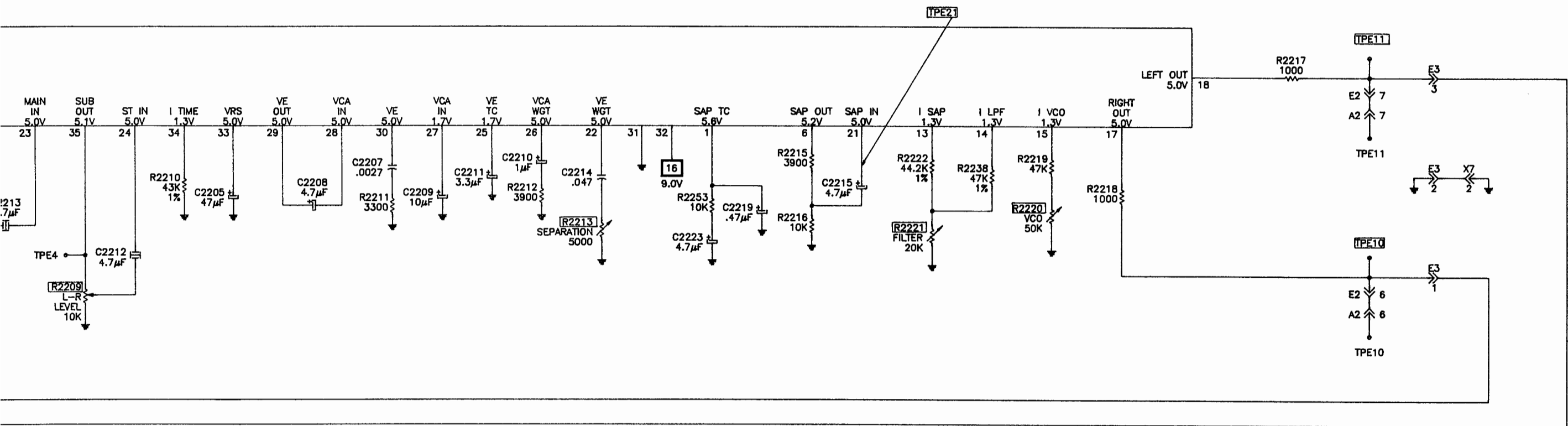
	BU	BH	AGC	BL	BM	ENABLE	DATA	CLOCK	BP	30V
VHF Low Band	1.0V	0V	7.7V	12.0V	12.0V	.6V	.2V	.2V	5.0V	4.1V
VHF High Band	4.0V	12.0V	7.7V	4.6V	12.0V	.6V	.2V	.2V	5.0V	7.1V
UHF Band	5.3V	0V	8.6V	.2V	12.0V	.6V	.2V	.2V	5.0V	8.4V

NOTE: VHF Low Band voltages taken on channel 2.
VHF High Band voltages taken on channel 7.
UHF Band voltages taken on channel 14.



CRT NECK ASSEMBLY

PANASONIC
MODEL CTM-2770S (CHASSIS ALEDP182)



PANASONIC
MODEL CTM-2770S (CHASSIS ALEDP182)

MISCELLANEOUS ADJUSTMENTS

PRETUNING

NOTE: All procedures require an antenna connected and power applied to the set. Select TV/CATV Switch setting.

AUTO MEMORY

1. Press the Set-Up button until the arrow points at "AUTO CH".
2. Press the plus button. Available channels are scanned and stored in memory.

ADD CHANNEL

1. Select channel.
2. Press the Set-Up button until the arrow points at the channel display.
3. Press the Plus button.
4. Repeat step one thru three to add other channels.

DELETE CHANNEL

1. Select channel.
2. Press the Set-Up button until the arrow points at the channel display.
3. Press the Minus button.
4. Repeat step one thru three to erase other channels.

CLOCK SETTING

1. Press the Set-Up button until the arrow points to "Time Set".
2. Press the Plus button to advance hours, Minus button to decrement hours.
3. Press the Set-Up button to turn minutes red.
4. Press the Plus button to advance minutes, Minus button to decrement minutes.

ON/OFF TIMER SETTING

1. Press the Timer button until the arrow points the "On Time display".
2. With the On Time hours in red, press the Plus button to advance hours, Minus button to decrement hours.
3. Press the Timer button to turn the On Time minutes red.
4. With the On Time minutes red, press the Plus button to advance minutes, Minus button to decrement minutes.
5. Press the Timer button until the Channel number is red.
6. Press the Plus or Minus button to select the desired channel.(only programmed channels are accessible).
7. Press the Timer button until Set is red.
8. Press the Plus button to select "YES" or "NO".

SLEEP TIMER

Press the SLEEP button, unit can be set to turn off after 90, 60, or 30 minutes by pressing the SLEEP button.

NORMALIZE ADJUSTMENTS

1. To return audio or video setting to their normal levels, press either the Audio or Video button.
2. Press the Norm button.

PINCUSHION ADJUSTMENT

Tune in a crosshatch patten. Adjust EW-PCC control (R761) for straightest vertical lines at the right and left sides of the screen.

PURITY ADJUSTMENT

Use a degaussing coil to demagnetize the CRT. Place a jumper between TP14 and ground. Turn Red Bias (R354) and Blue Bias (R555) counter clockwise to obtain a green screen. Adjustment of Drive Controls is necessary. Loosen Deflection Yoke (L570) and move it back as far as possible. Lossen locking ring and move the purity tabs to center the vertical green band. Slowly slide the deflection yoke forward until a uniform green screen is obtained.

CONVERGENCE ADJUSTMENTS

Connect a signal generator to antenna terminals and tune in a dot pattern. Adjust 4-pole magnets to converge the red blue dots at the center of the screen. Adjust 6-pole magnets to converge the red/blue dots over the green dots at the center of the screen. Tune in a crosshatch patten. Remove rubber wedges between the Deflection Yoke (L570) and the CRT. Tilt Deflection Yoke up or down to converge the vertical lines at the top and bottom of the screen and the horizontal lines at the right and left sides of the screen. Tilt Deflection Yoke to the right or left to converge the horizontal lines at the top and bottom of the screen and the vertical lines at the right and sides of the screen. Repeat convergence procedure if necessary to obtain the best overall convergence. Replace rubber wedges.

MISCELLANEOUS ADJUSTMENTS (CONTINUED)

COLOR TEMPERATURE ADJUSTMENT

Connect a signal generator to antenna terminals and tune in a crosshatch patten. Set Screen Control (R555B) and Brightness to MINIMUM. Adjust Red (R354), Green (R356) and Blue (R355) Bias Controls to minimum. Set Red (R358) and Blue (R357) Drive Controls to midpoint. Adjust screen control to obtain a barely visible pattern. Note color of the faintly visible pattern and leave that Bias Control at Minimum. Adjust the other two leave that Bias Controls for best white balance of the faintly visible pattern. Turn Brightness to Maximum and adjust Bias Controls for best white balance of the pattern.

This set employs Digital customer controls. All adjustments are at normalized position unless otherwise indicated. CATV Switch (S063) to TV.

B+ CHECK

Connect a digital DC voltmeter to TP91, low side to TP92. Set Brightness, Picture and Color to MINIMUM. With AC line voltage set to 120VAC, B+ should read 130.5VDC +/- 1VDC

HIGH VOLTAGE CHECK

Tune in a picture. Connect a high voltage probe to CRT anode. High Voltage must read 29.5KV (+1.0KV - 1.5KV).

RF AGC ADJUSTMENT

Tune in a picture. Adjust AGC control (R106) counterclockwise until snow appears in picture, then clockwise to a point just past where snow disappears.

SUB-BRIGHTNESS ADJUSTMENT

Tune in a picture. Set Brightness, Picture and Color controls to MINIMUM. Adjust Sub-Brightness Control (R318) for just visible highlights. Set Brightness, Picture and Color controls to Maximum. Check for blooming readjust if required.

SUB-CONTRAST ADJUSTMENT

NOTE: Do not make adjustments to Sub-Contrast Control unless CRT, CRT Board, or associated components are replaced.

Tune in a Color Bar Pattern. Connect an oscilloscope to TP13, low side to ground. Adjust Sub-Contrast Control (R304) for 2.0VP-P level of the video portion of the waveform.

HORIZONTAL WIDTH ADJUSTMENT

Tune in a crosshatch pattern. Adjust Horizontal Width Control (R760) for proper horizontal width.

HORIZONTAL CENTERING ADJUSTMENT

Tune in a color bar pattern. Adjust Horizontal centering control (R524) for best horizontal centering.

VIDEO LEVEL ADJUSTMENT

Tune in a color bar pattern. Connect an oscilloscope to plug X2 pin 7, low side to ground. Adjust Video Level control (R114) for .6VP-P level of video component of waveform.

COMB FILTER ADJUSTMENT

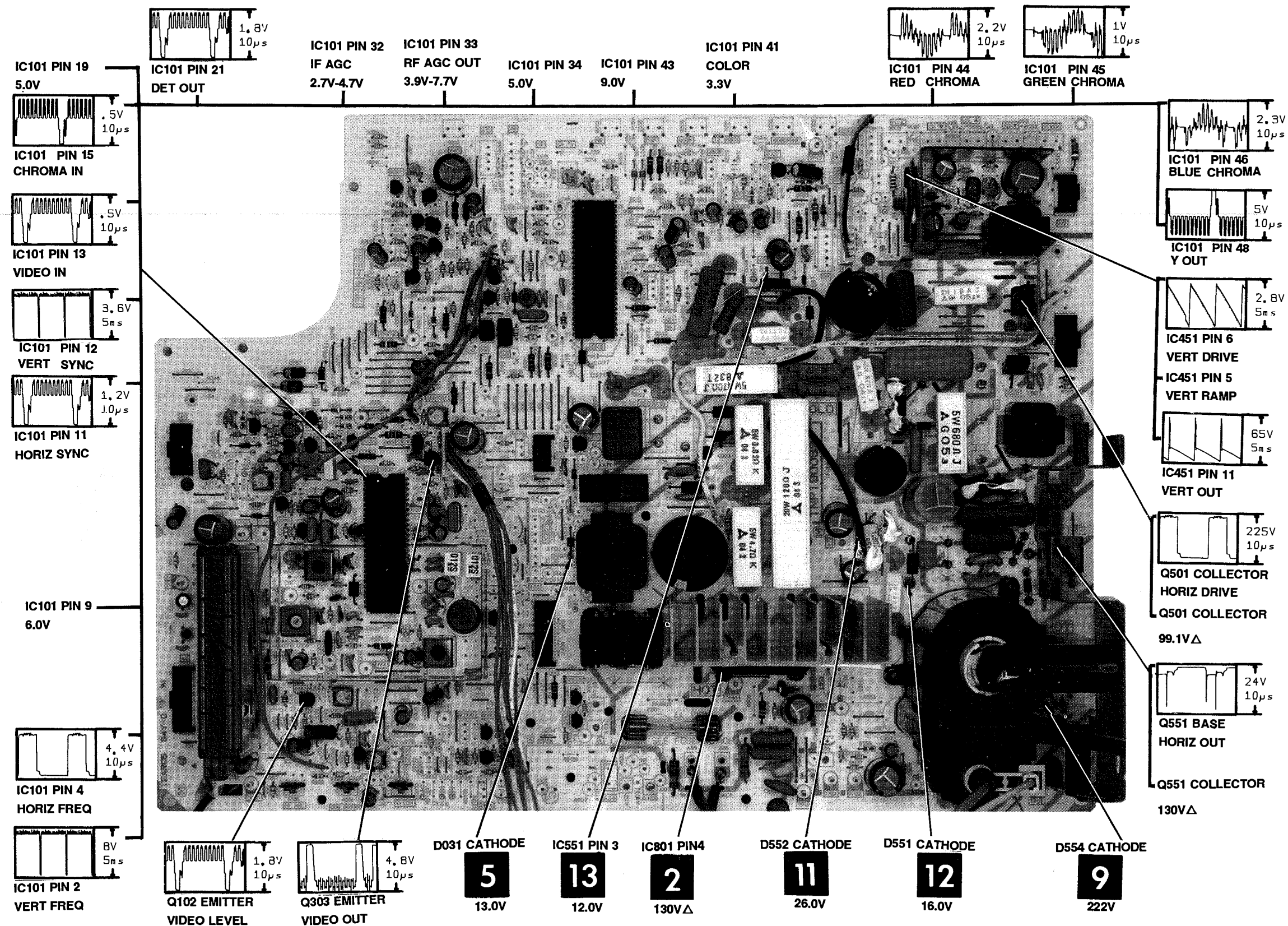
Tune in a color bar pattern. Connect an oscilloscope to TP13, low side to ground. Adjust Balance Control (R335), and Phase Coil (L304) for MINIMUM chroma component of waveform.

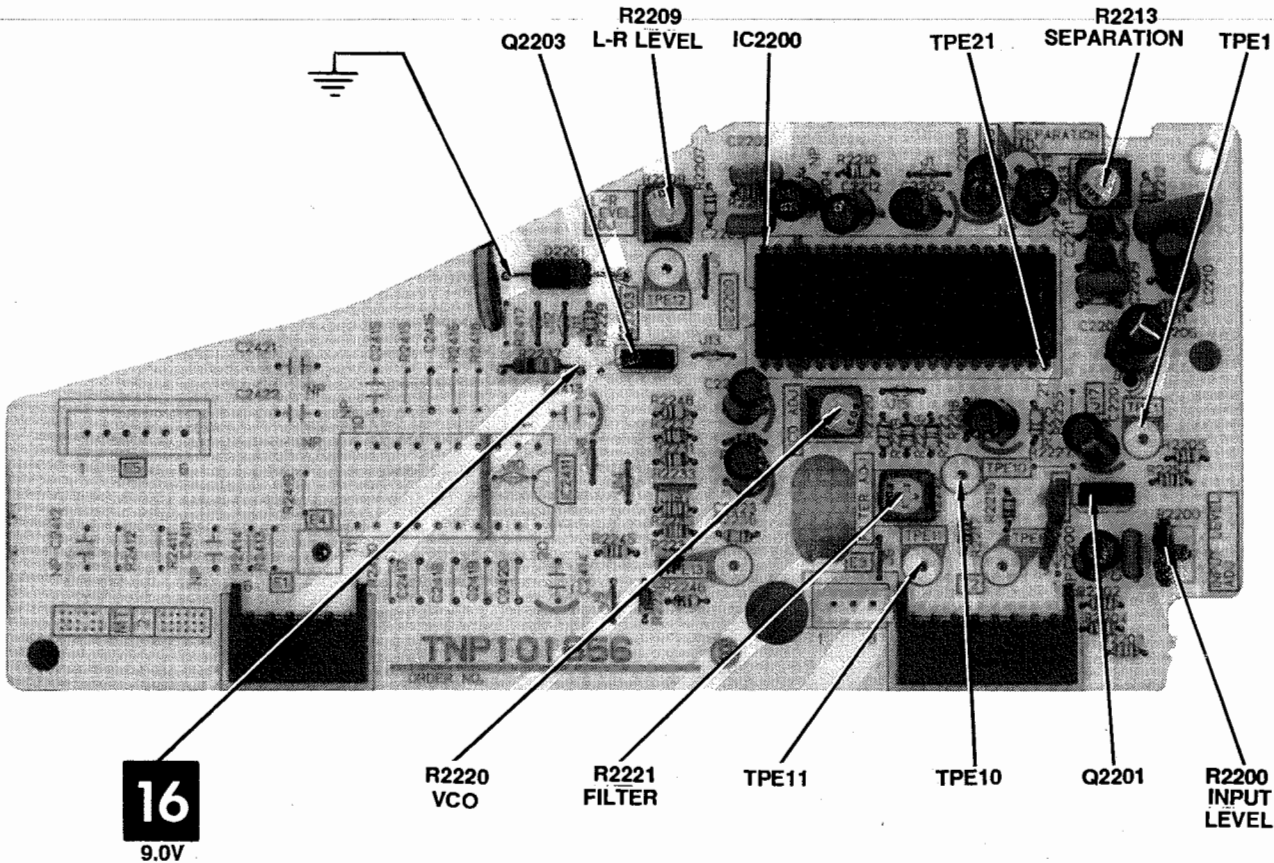
MPU REFERENCE OSCILLATOR

Tune in channel 13. Connect a frequency counter to connector A3 pin 4. Set TV/CATV switch to TV. Connect a jumper from pin 7 of IC001 to ground. Adjust MPU Reference Oscillator Control(C031) for exactly 500KHz +/- 3.5Hz

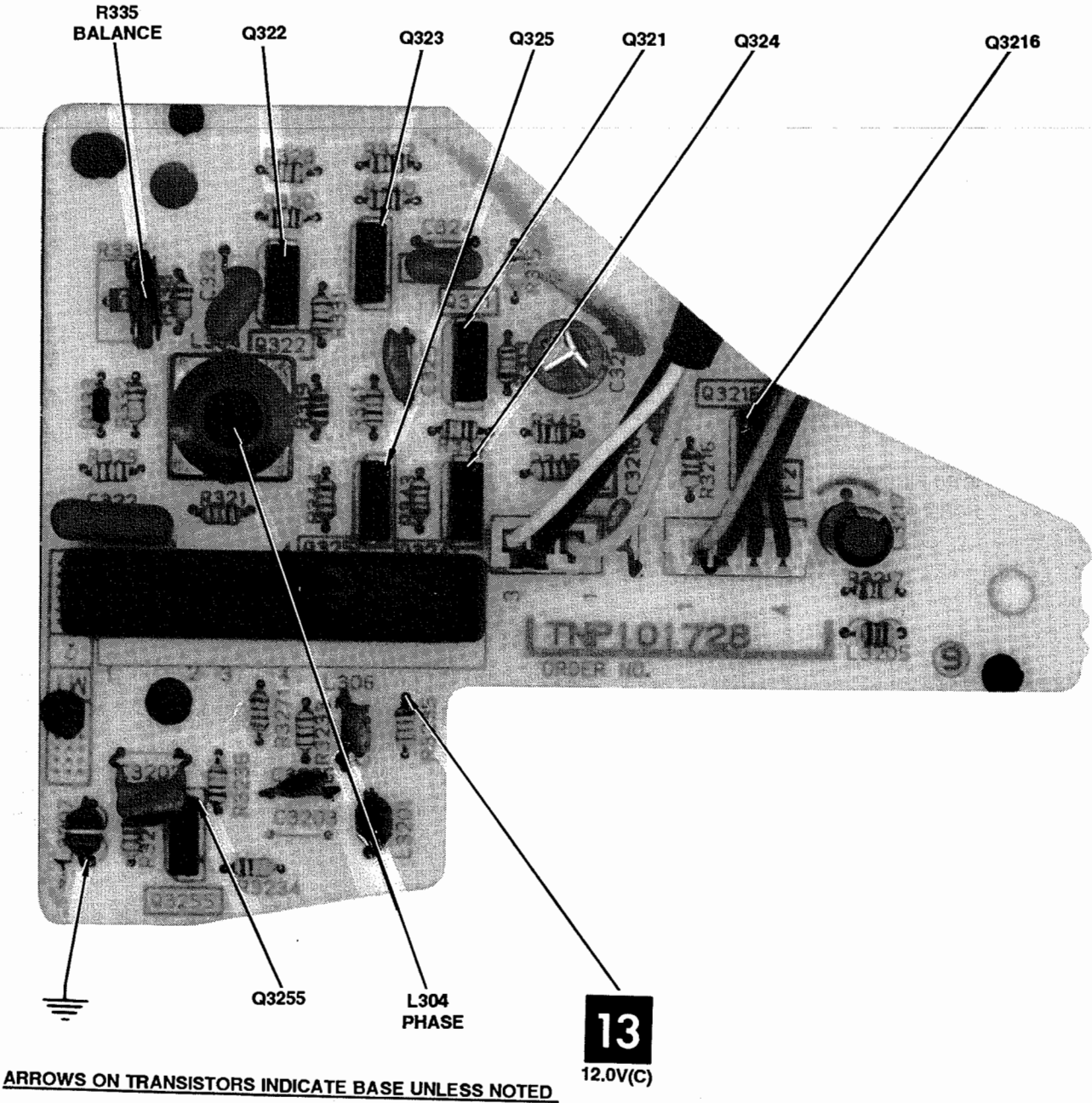
SUB-TINT ADJUSTMENT

Tune in an active channel. Adjust Sub-Tint Control (R619) for normal skin tones.

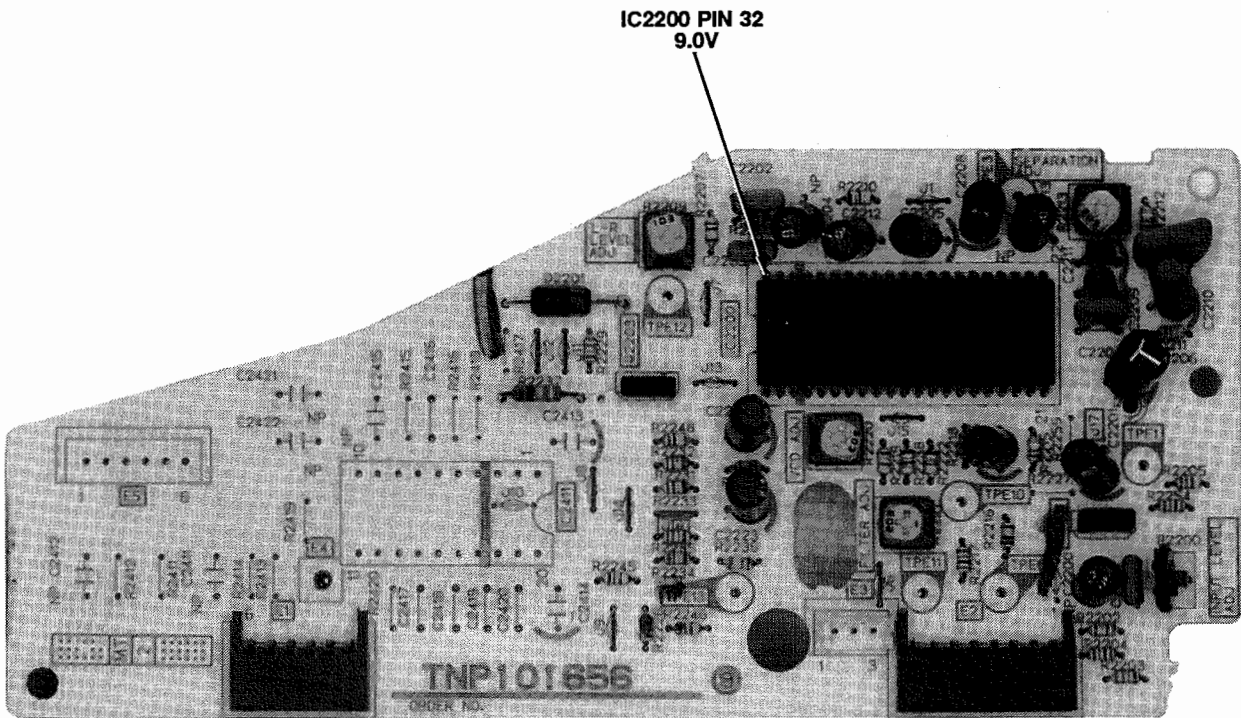
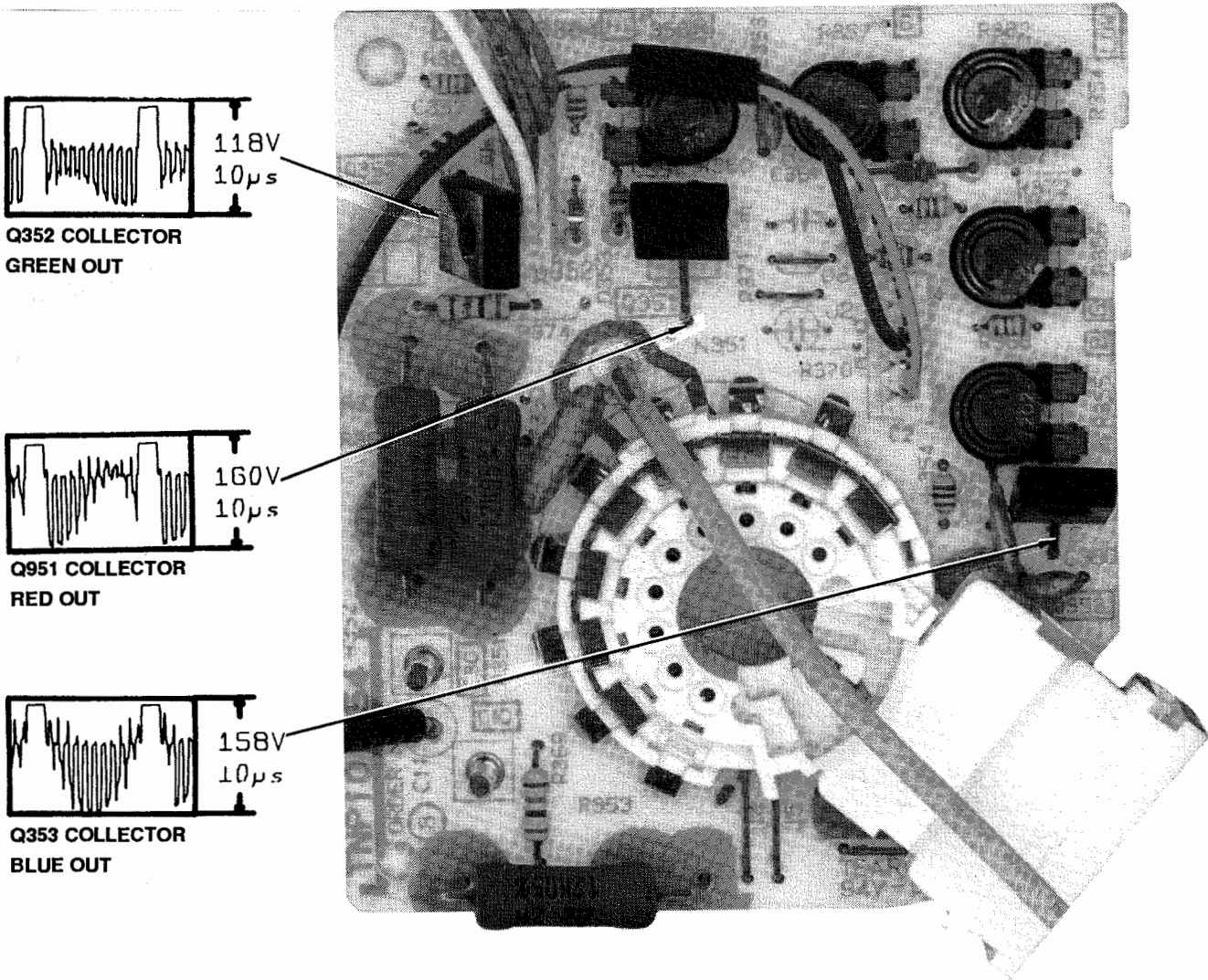


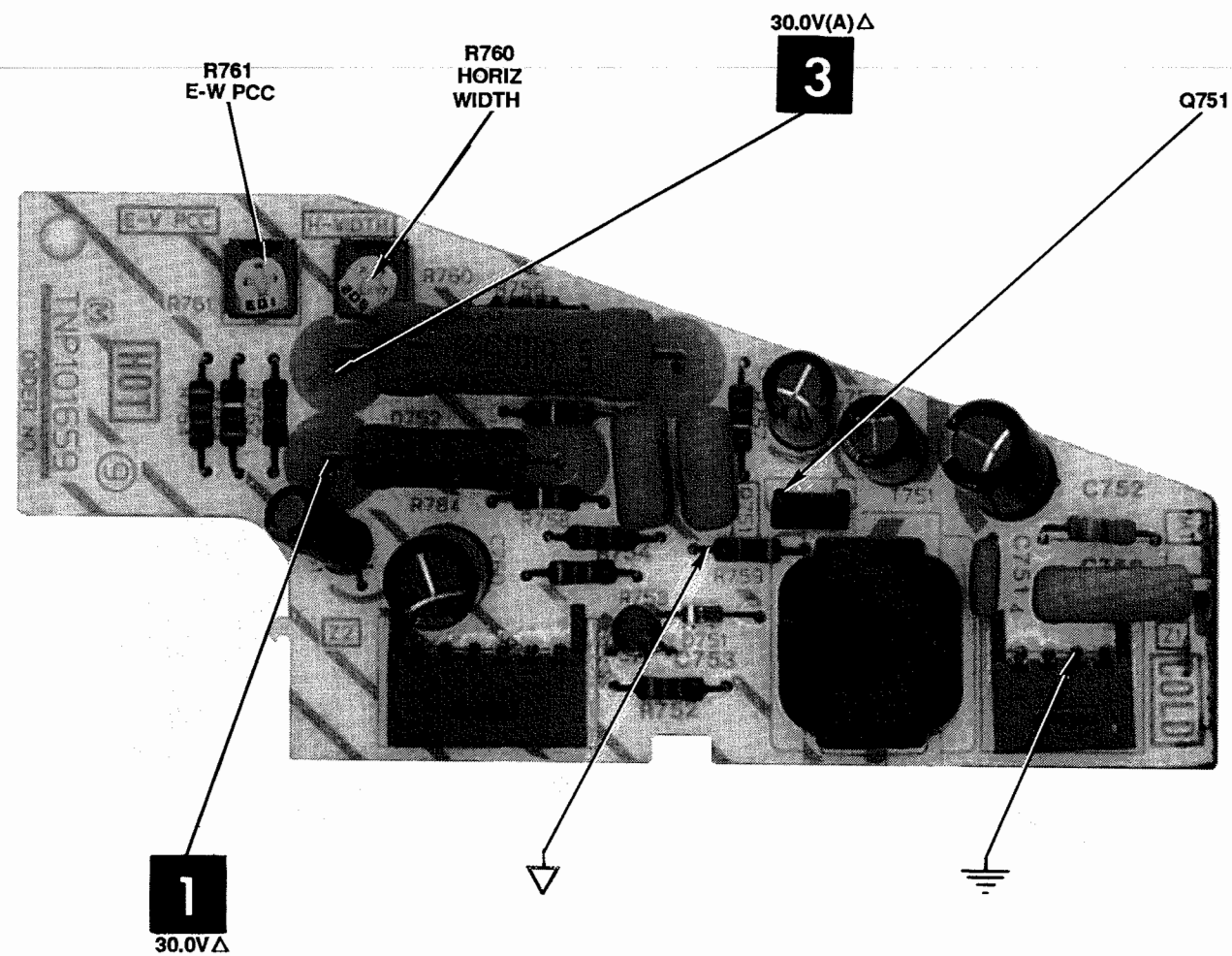


ARROWS ON IC'S INDICATE PIN 1 UNLESS NOTED
ARROWS ON TRANSISTORS INDICATE BASE UNLESS NOTED

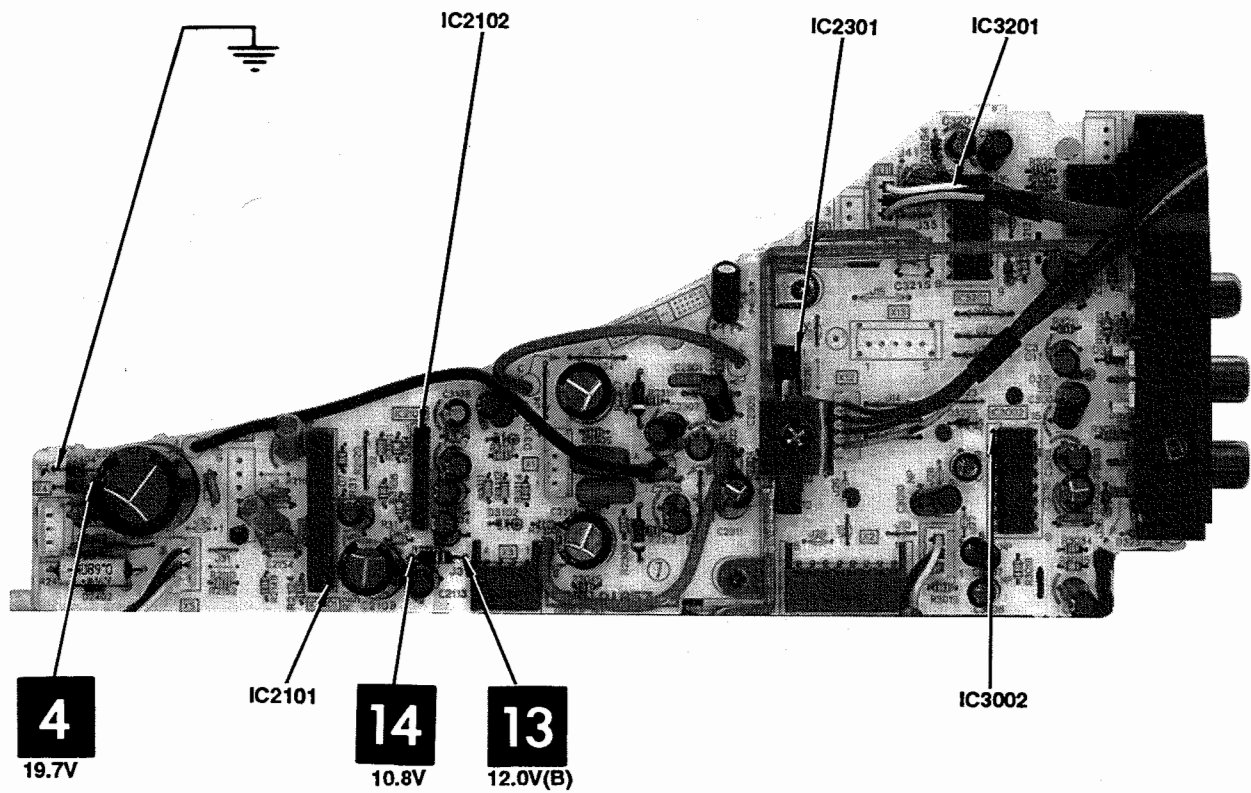


ARROWS ON TRANSISTORS INDICATE BASE UNLESS NOTED

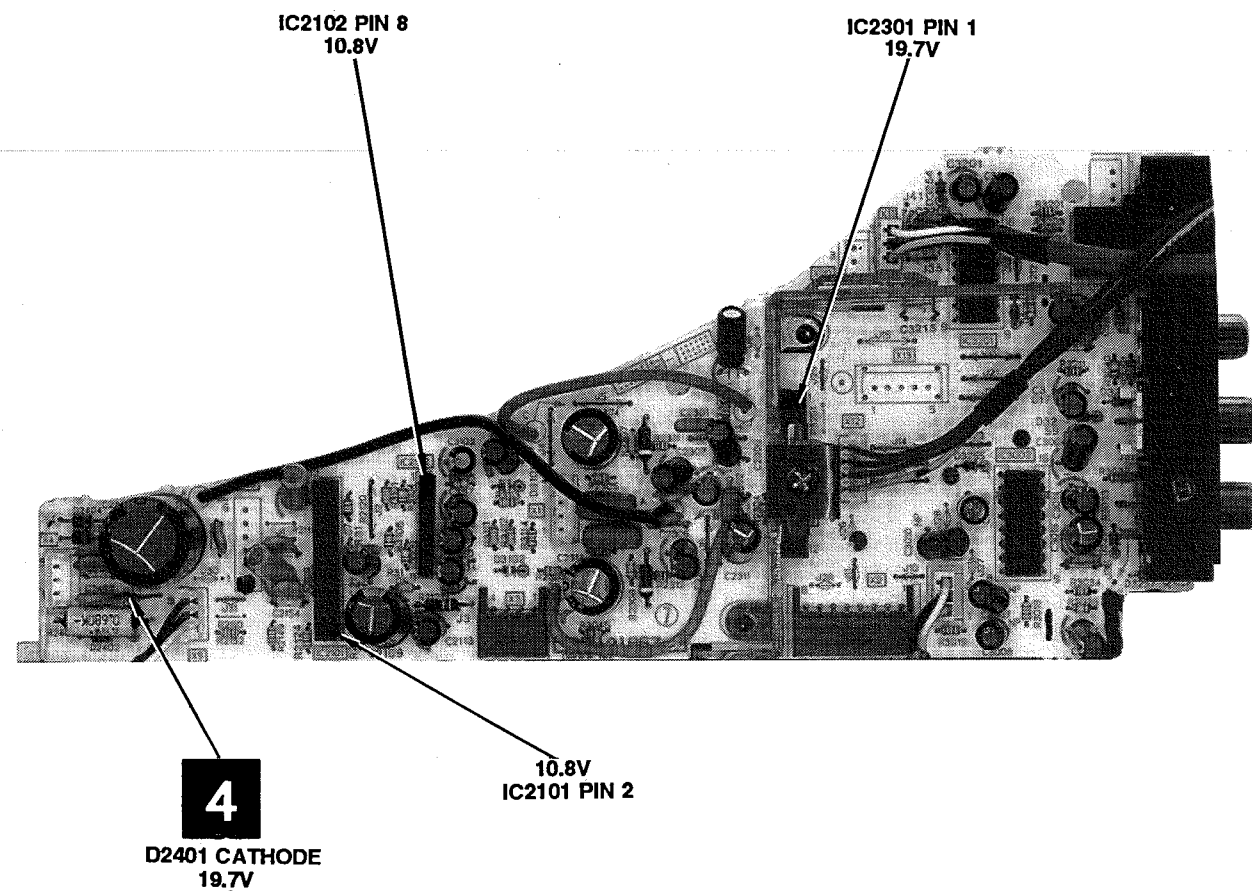




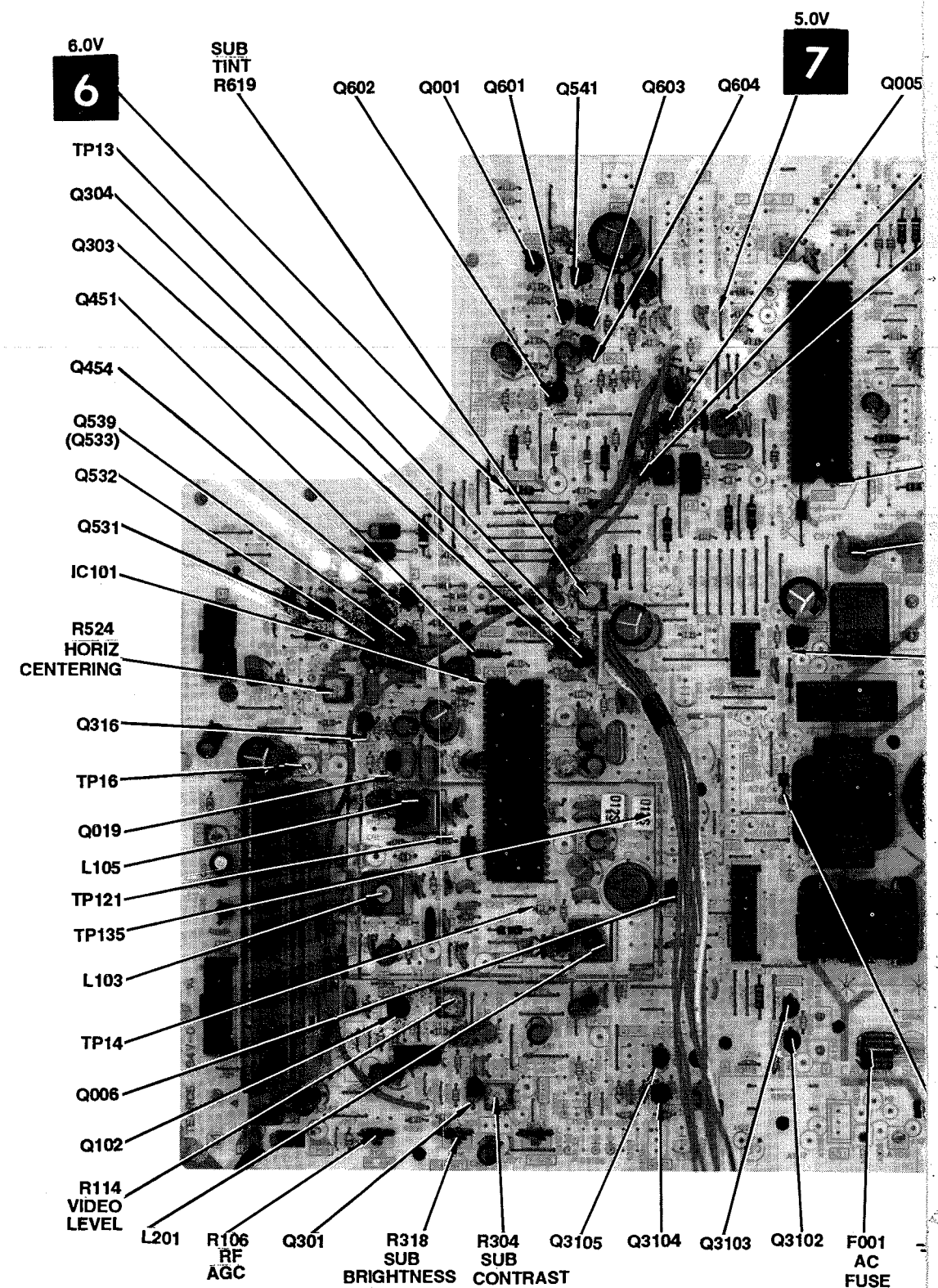
▽-COMMON TIE POINT
Δ-TAKEN FROM COMMON TIE POINT
NOTE: ARROWS ON TRANSISTORS INDICATE BASE UNLESS NOTED



ARROWS ON IC'S INDICATE PIN 1 UNLESS NOTED
ARROWS ON TRANSISTORS INDICATE BASE UNLESS NOTED



TV/VIDEO BOARD



▽-COMMON TIE POINT

△-TAKEN FROM COMMON TIE POINT

NOTE: ARROWS ON IC'S INDICATE PIN1 UNLESS NOTED

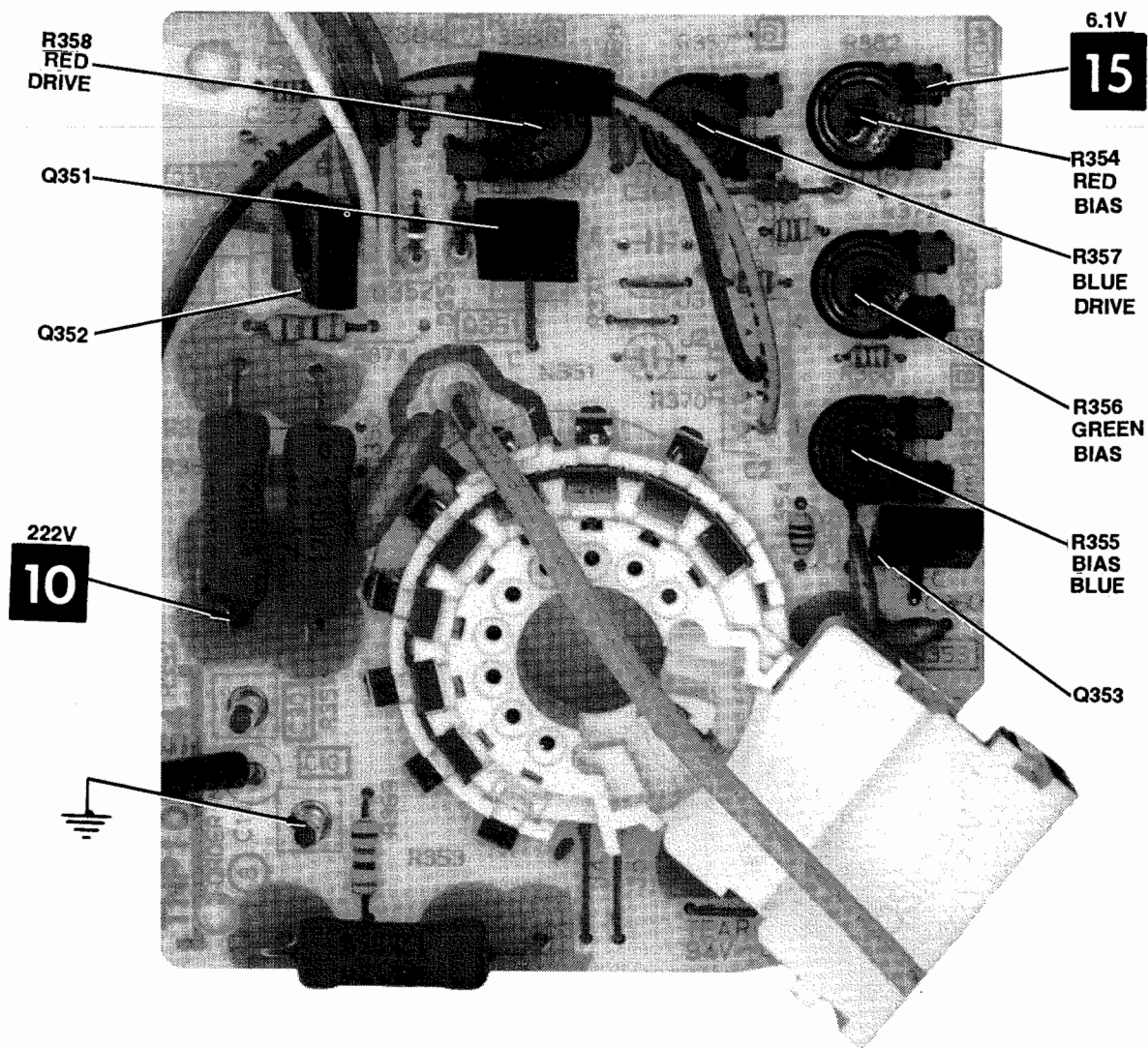
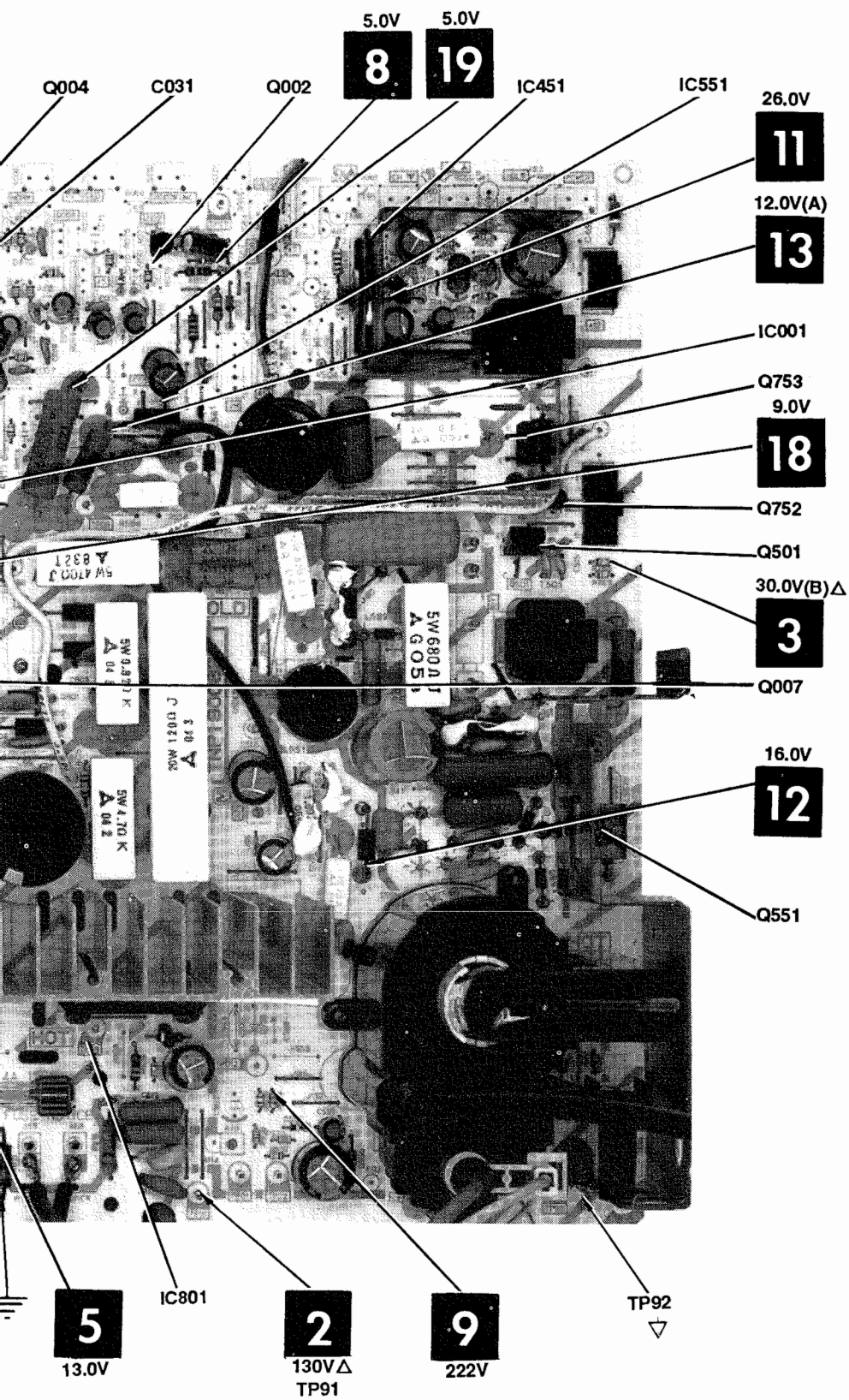
NOTE: ARROWS ON TRANSISTORS INDICATE BASE UNLESS NOTED

MAIN BOARD-TOP

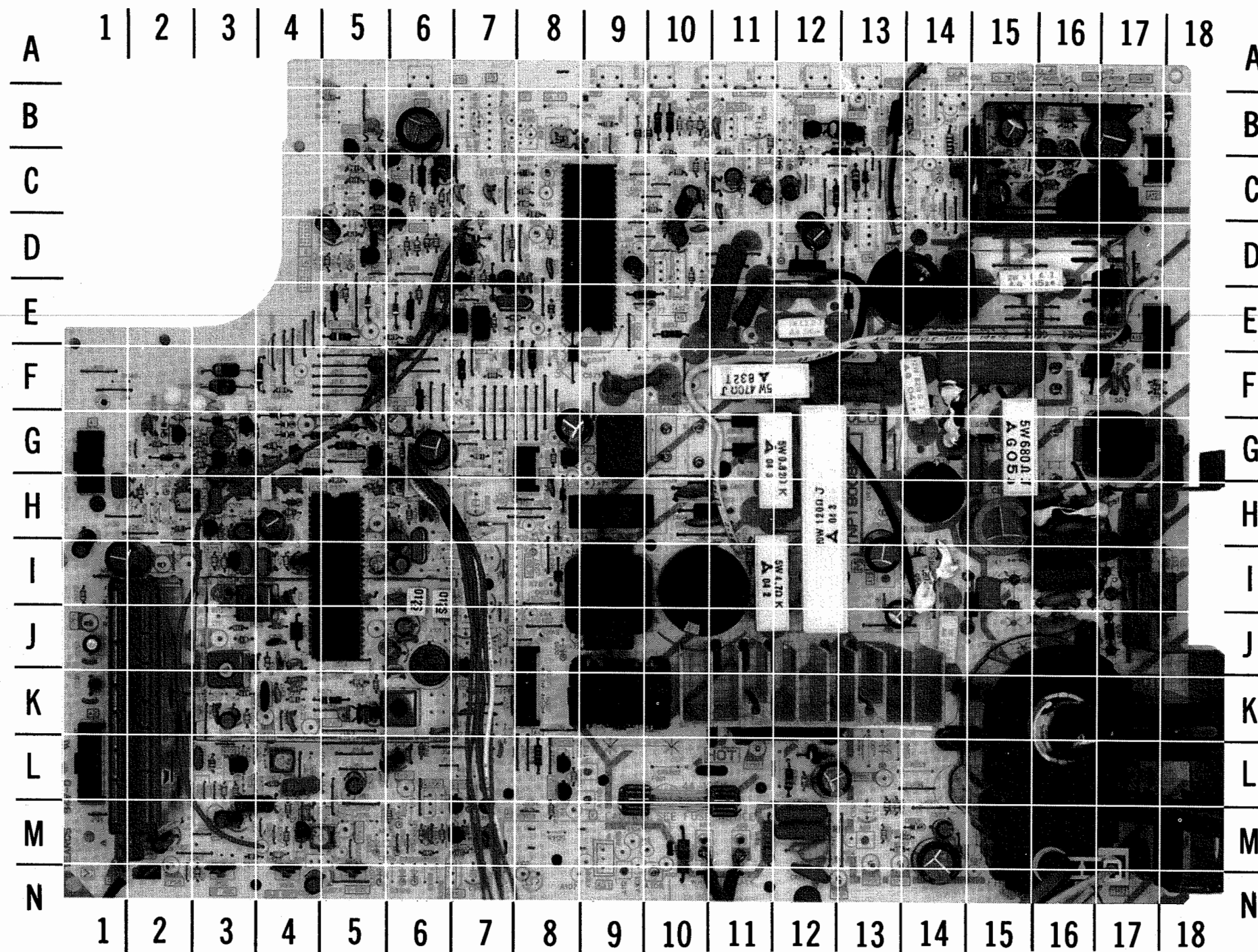
MAIN BOARD-TOP VIEW-GridTrace Location GUIDE

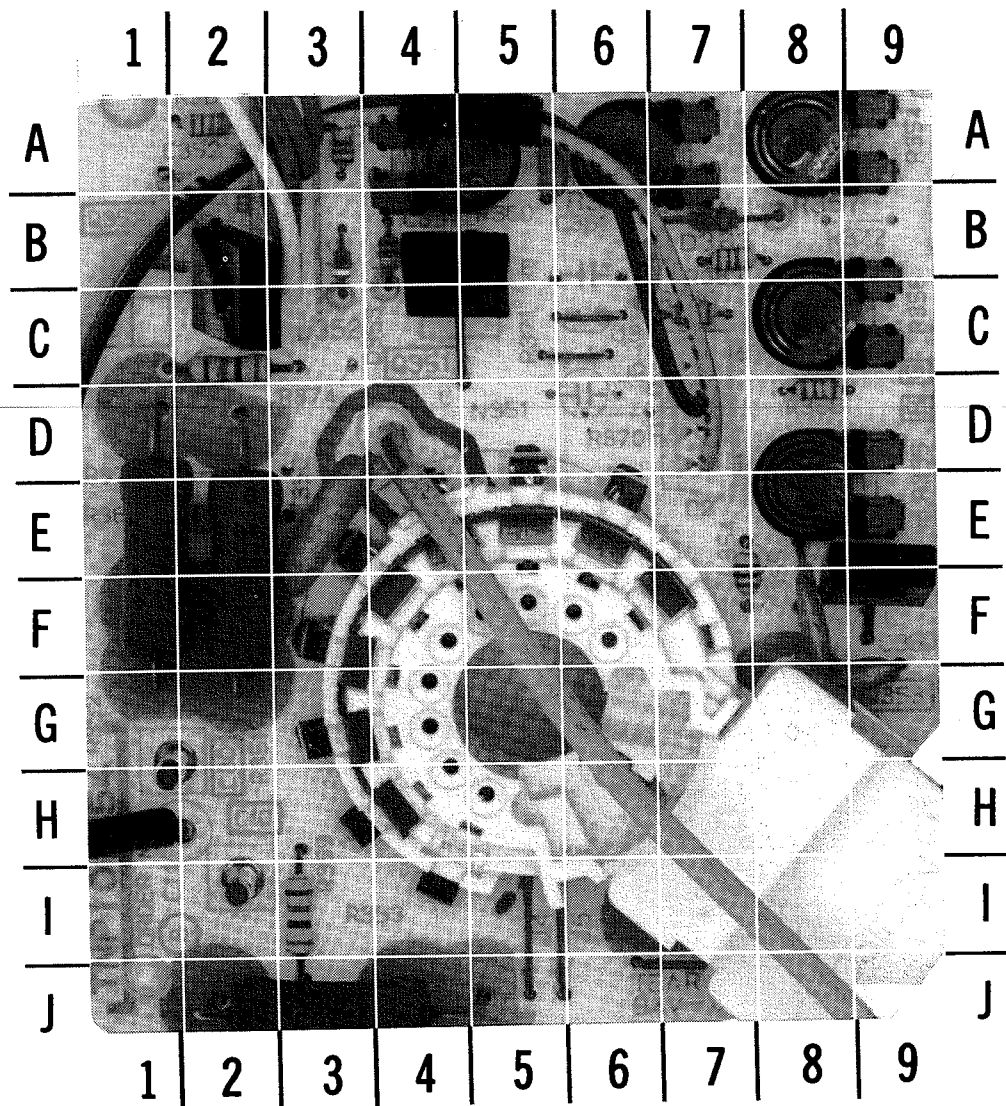
A1	H-1	C126	J-4	C559	J-13	D555	M-14	Q531	G-2	R083	D-7	R454	C-17	R611	H-6	X601	I-6
A2	L-1	C151	J-3	C561	J-16	D556	M-14	Q532	G-3	R085	I-3	R455	B-16	R615	E-6		
A3	H-8	C152	J-4	C562	H-16	D557	F-3	Q539	G-3	R086	I-3	R456	B-16	R616	G-5		
A4	K-8	C153	K-3	C564	H-16	D558	H-16	Q541	C-6	R087	J-7	R457	B-16	R617	C-6		
A5	C-11	C154	K-3	C565	G-15	D559	F-14	Q551	I-17	R088	K-1	R456	B-16	R618	G-6		
A6	E-10	C155	J-4	C566	I-13	D560	F-3	Q601	C-5	R090	E-6	R459	B-18	R619	G-6		
A7	B-14	C201	M-4	C567	D-13	D603	E-5	Q602	D-5	R092	F-6	R460	B-17	R620	C-5		
A8	E-7	C202	L-4	C569	I-15	D801	H-10	Q603	C-6	R093	C-6	R461	B-10	R621	C-5		
A11	H-6	C203	K-4	C570	D-12	D802	G-11	Q604	D-6	R094	D-7	R462	G-7	R622	D-5		
A12	B-17	C207	J-6	C571	F-9	D803	G-11	Q752	E-17	R095	J-1	R463	C-16	R623	C-5		
A13	E-17	C212	K-4	C572	I-16	D804	H-10	Q753	D-17	R096	I-1	R464	C-16	R624	D-5		
A17	D-13	C214	K-5	C573	H-16	D806	G-9	Q3202	L-8	R097	I-1	R465	G-4	R626	D-6		
A33	G-10	C217	K-4	C575	I-16	DY	F-16	Q3204	M-7	R106	N-3	R469	G-4	R628	D-6		
AG	E-7	C301	M-4	C580	H-16	F001	L-9	Q3205	M-7	R107	L-4	R471	B-10	R629	D-6		
C001	A-11	C302	C-6	C601	K-6	IC001	E-9	R001	E-10	R108	J-4	R475	B-15	R630	C-6		
C002	D-9	C303	N-4	C605	H-6	IC101	H-4	R002	F-8	R109	J-3	R476	F-4	R631	D-6		
C004	C-10	C305	L-5	C606	I-5	IC451	B-15	R004	A-5	R110	L-3	R501	H-3	R632	D-6		
C005	C-11	C306	F-5	C607	H-6	IC551	D-12	R005	B-5	R111	L-3	R502	G-3	R765	F-17		
C006	C-11	C307	F-5	C608	H-6	IC801	K-11	R008	B-10	R112	I-3	R503	H-2	R766	E-17		
C007	D-10	C309	H-3	C609	H-5	L006	B-10	R009	B-10	R113	K-5	R505	H-4	R767	F-17		
C009	C-10	C310	I-6	C610	D-5	L007	B-9	R012	B-10	R114	L-4	R506	G-4	R768	D-15		
C010	C-11	C312	H-6	C625	D-5	L008	C-8	R013	E-7	R120	L-8	R508	H-2	R801	G-12		
C011	C-11	C314	G-5	C626	C-7	L010	E-6	R015	E-7	R151	K-3	R509	G-18	R802	H-12		
C012	D-12	C324	F-6	C759	D-14	L011	E-8	R016	E-7	R152	K-3	R510	F-13	R803	F-11		
C013	D-8	C401	I-4	C802	H-10	L012	F-8	R020	C-6	R153	J-4	R511	F-13	R804	L-12		
C014	B-6	C402	I-4	C803	G-11	L103	J-3	R021	D-7	R201	M-4	R513	I-3	R805	I-11		
C015	B-6	C403	L-6	C804	H-10	L104	I-6	R022	D-8	R203	K-3	R516	E-5	R807	L-12		
C017	B-13	C405	L-6	C805	I-10	L105	I-3	R023	D-7	R209	K-5	R517	H-2	R809	L-12		
C018	C-12	C451	B-15	C806	L-12	L106	L-3	R024	C-8	R212	J-6	R524	H-2	R810	I-12		
C019	C-11	C452	C-15	C812	H-15	L108	I-6	R025	C-8	R213	K-4	R531	F-4	R815	M-10		
C021	J-2	C453	B-16	C817	M-12	L109	J-4	R028	C-8	R214	K-4	R532	G-3	R816	M-11		
C022	D-8	C454	B-17	C818	M-12	L201	K-6	R030	B-9	R303	M-4	R533	G-3	R1103	D-10		
C023	D-8	C455	C-15	C819	M-12	L202	J-3	R031	B-11	R304	M-5	R534	G-2	R3116	F-7		
C024	D-7	C457	C-16	C3202	M-6	L551	H-15	R032	E-10	R305	E-5	R535	G-2	R3119	M-7		
C025	C-7	C458	C-16	C3205	M-7	L555	L-17	R035	F-7	R306	G-5	R536	G-2	R3120	M-7		
C026	I-1	C501	H-3	CRA801	N-12	L556	I-18	R037	C-10	R307	G-6	R537	G-3	R3121	M-6		
C027	H-1	C502	H-3	D001	C-12	L558	I-17	R038	C-10	R308	M-3	R538	G-3	R3123	L-8		
C028	K-1	C503	H-4	D004	B-13	L559	G-15	R039	C-10	R309	C-6	R539	G-3	R3124	M-8		
C029	M-1	C504	H-4	D005	D-7	L561	E-13	R040	C-10	R310	H-5	R540	G-3	R3130	M-6		
C030	M-2	C505	G-4	D020	D-7	L562	H-16	R042	D-10	R311	G-5	R541	G-5	R3131	M-6		
C031	D-7	C506	G-3	D021	D-7	L563	H-16	R043	C-11	R314	G-5	R542	H-4	R3139	M-6		
C034	B-8	C507	G-3	D022	C-13	L564	G-14	R044	B-11	R316	E-16	R544	C-6	RL001	H-9		
C035	B-4	C508	H-1	D031	I-8	L565	F-14	R045	C-10	R317	N-3	R547	C-5	T001	I-9		
C044	H-8	C512	G-2	D032	H-8	L751	E-14	R047	B-10	R318	N-4	R551	J-14	T501	G-17		
C045	G-6	C513	F-17	D302	E-6	L801	K-9	R049	D-5	R320	H-3	R552	I-14	T502	C-17		
C057	J-1	C514	G-17	D304	G-6	Q001	B-5	R050	B-14	R323	M-4	R554	M-13	T551	K-16		
C071	K-2	C515	F-17	D451	C-15	Q002	B-12	R051	B-13	R324	F-5	R555	M-13	TF	G-10		
C103	I-4	C518	I-3	D452	G-4	Q004	E-6	R052	B-12	R326	H-3	R556	M-13	TP13	G-6		
C104	I-5	C531	G-3	D453	G-4	Q005	E-7	R053	B-13	R327	F-6	R557	M-14	TP14	K-5		
C105	I-6	C533	G-2	D454	G-4	Q006	K-7	R055	C-13	R334	E-5	R558	E-12	TP16	I-2		
C106	I-6	C541	C-5	D457	H-4	Q007	G-8	R056	G-8	R336	C-6	R559	E-11	TP91	N-13		
C109	J-6	C542	B-5	D502	I-2	Q019	I-3	R071	K-5	R337	H-5	R560	F-9	TP92	N-17		
C110	I-3	C551	F-15	D531	G-3	Q102	L-3	R072	I-1	R339	G-5	R565	F-14	TP121	J-4		
C112	I-4	C553	M-14	D532	G-2	Q303	G-6	R073	B-12	R401	I-4	R569	E-11	TP135	J-6		
C115	M-3	C554	I-14	D533	G-2	Q304	G-5	R074	E-12	R402	L-6	R570	M-14	X001	E-7		
C119	K-5	C555	I-14	D542	B-5	Q316	H-3	R078	F-7	R403	K-7	R580	G-15	X101	J-6		
C120	J-6	C556	L-17	D551	I-15	Q451	G-4	R079	C-12	R451	B-14	R604	I-6	X102	L-3		
C121	J-6	C557	M-14	D552	I-14	Q454	G-3	R080	E-6	R452	B-14	R609	H-6	X201	K-4		
C122	K-7	C558	G-8	D554	L-17	Q501	F-17	R081	D-7	R453	N-5	R610	H-6	X501	H-4		

PANASONIC
MODEL CTM-270S (CHASSIS ALEDP182)



PANASONIC
MODEL CTM-270S (CHASSIS ALEDP182)



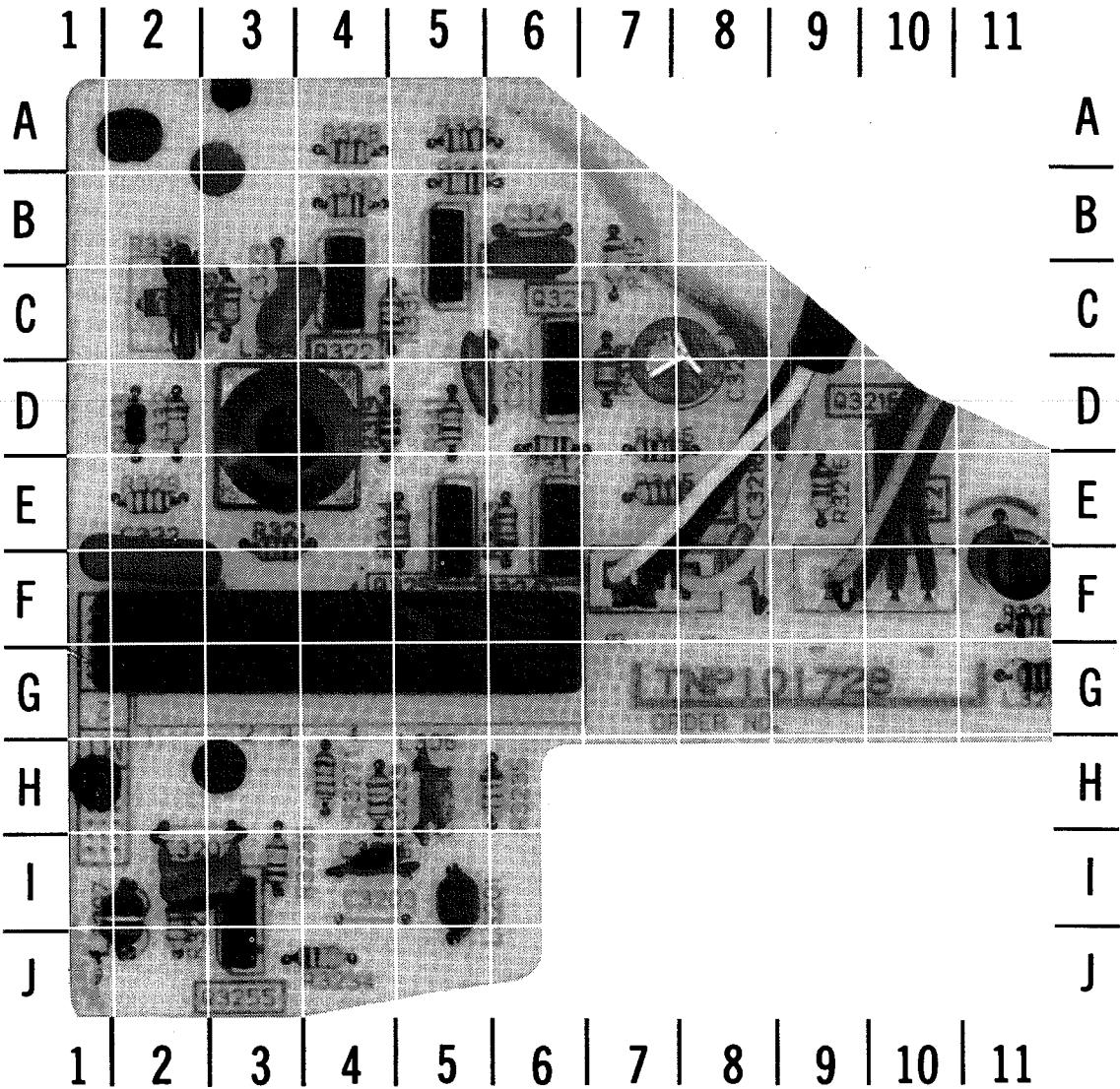


A HOWARD W. SAMS GRIDTRACE™ PHOTO

CRT-BOARD

CRT BOARD-GridTrace Location Guide

C1	C-3	R351	E-2	R369	I-3
C2	D-7	R352	E-1	R380	C-7
C350	E-3	R353	J-3	R382	A-8
C351	B-4	R354	A-8	R383	B-7
C352	A-2	R355	E-8	R384	A-3
C353	A-5	R356	C-8		
C355	F-8	R357	A-6		
C360	G-9	R358	A-5		
D352	B-3	R360	A-4		
D353	B-4	R361	A-6		
D383	B-7	R363	A-2		
L354	F-7	R364	E-2		
Q351	B-4	R365	C-2		
Q352	C-2	R367	A-8		
Q353	F-9	R368	D-8		



A HOWARD W. SAMS GRIDTRACE™ PHOTO

COMB FILTER BOARD

COMB FILTER BOARD-GridTrace Location Guide

C322	F-2	R313	C-7	R3233	H-4
C323	C-4	R315	B-7	R3234	J-4
C324A	B-6	R319	D-4	R3235	H-6
C325	D-5	R321	E-3	R3236	I-3
C3202	I-2	R322	A-5	R3270	J-2
C3204	H-5	R328	A-4	R3271	H-4
C3205	I-4	R329	E-2		
C3216	F-8	R330	B-4		
C3217	F-11	R331	C-5		
F1	F-7	R332	D-2		
F2	F-10	R333	D-2		
L304	D-3	R335	C-2		
L306	F-4	R338	C-3		
L3201	I-5	R340	B-5		
L3205	G-11	R341	D-5		
L3207	J-2	R342	D-6		
Q321	D-6	R343	E-6		
Q322	C-4	R344	E-7		
Q323	B-5	R345	E-7		
Q324	E-6	R346	D-7		
Q325	E-5	R3215	D-9		
Q3216	E-10	R3216	E-9		
Q3255	I-3	R3217	F-11		

ELECTROLYTIC CAPACITORS Items not listed are normally available at local distributors.

ITEM No.	RATING	MFGR PART No.	ITEM No.	RATING	MFGR PART No.
C028	10 16V	ECSZ16EF10	# C812	33 160V	ECEA160V33Z
C202	1 50V NP	ECEA1HN010S	C2200	10 16V NP	ECEA1CN100S
C301	10 16V NP	ECEA1CN100S	C2204	.22 50V NP	ECEA1HNR22S
C321	47 10V NP	ECEA1AN470S	C2209	10 16V	ECSZ16EF10
C452	1 25V	ECSZ25EF1V	C2211	3.3 16V	ECSZ16EF10
# C531	33 25V	ECEA1EU330	C2212	4.7 25V NP	ECEA1EN4R7S
# C553	22 250V	ECEA2EU220	C2213	4.7 25V NP	ECEA1EN4R7S
# C559	220 25V	ECEA1EU221	C3007	3.3 50V NP	ECEA1HN3R3S
# C566	470 35V	ECEA1VU471	C3008	3.3 50V NP	ECEA1HN3R3S
C753	22 16V	ECSZ16EF22	C3009	3.3 50V NP	ECEA1HN3R3S
# C805	470 200V	ECES2DU471M	C3010	3.3 50V NP	ECEA1HN3R3S
# C806	22 160V	ECEA2CU220			

For Safety use only Equivalent Replacement Parts.

CAPACITORS Items not listed are normally available at local distributors.

ITEM No.	RATING	MFGR PART No.	ITEM No.	RATING	MFGR PART No.
C022	27 N150 50V 5%	ECCF1H270JP	# C569	.0056 200V 5%	ECQM2562JZ
C023	27 N150 50V 5%	ECCF1H120JP	# C572	.0033 1200 5%	ECWH12H332JS
	12 N150 50V 5%	-----	# C573	180 2KV 5%	ECKD3D391JB
C031	30pf Trimmer	ECRHA030E41	# C575	680 2KV 5%	ECKD3D681JB
C103	2 NPO 50V .25pf	ECCF1H020CC		820 2KV 5%	ECKD3D821JB
C104	2 NPO 50V .25pf	ECCF1H020CC		470 2000 5%	ECKD3D471JB
C112	18 NPO 50V 5%	ECCF1H180JC	# C580	560 2000 5%	ECKD3D561JB
C151	68 NPO 50V 5%	ECCF1H680JC	C605	8 N750 50V .5pf	ECCF1H080DU
C152	15 NPO 50V 5%	ECCF1H150JC	# C802	.0047 500V	ECKD2H472PU
C155	2 N075 50V .25pf	ECCF1H020CC	# C803	.0047 500V	ECKD2H472PU
C207	68 N075 50V 10%	ECCF1H680KP	# C804	.0047 500V	ECKD2H472PU
C314	18 NPO 50V 5%	ECCF1H180JC	# C817	.015 125VAC 10%	ECQU1A153KH
C503	220 N750 50V 5%	ECCF1H221JU	# C818	.015 125VAC 10%	ECQU1A153KH
# C533	.01 50V	ECKF1H103ZF	# C819	.0022 12VAC	ECKCFL222ZE
# C551	.5 200V 5%	ECQF2H504JS	C3202	56 NPO 50V 5%	ECCF1H560JC
# C561	820 2KV 5%	ECKD3D821B	C3205	12 NPO 50V 5%	ECCF1H120JC
# C562	390 2KV 5%	ECKD3D391JB			
# C564	.01 1200 5%	ECWH12H103JS			
# C565	.047 200V 5%	ECQM2473JZ			

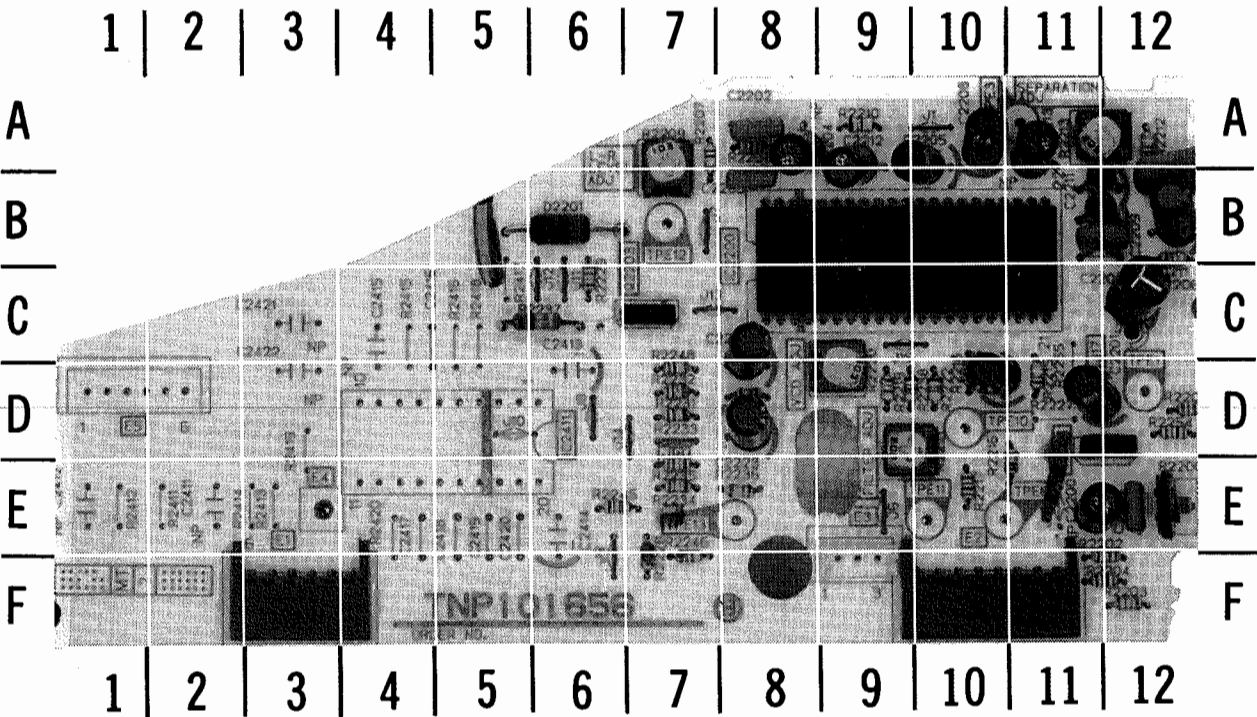
For Safety use only Equivalent Replacement Parts.

CONTROLS (All wattages 1/2 watt or less, unless listed.)

ITEM No.	FUNCTION	RESISTANCE	MFGR PART No.	NOTES
R106	RF AGC	5000	EVN60AA00B53	
R114	Video Level	500	EVND4AA00B52	
R304	Sub Contrast	2000	EVND4AA00B23	
R318	Sub Brightness	10K	EVN60AA00B14	
R335	Comb Filter	200	EVN60AA00B22	
R354	Red Bias	2000	EVN49AA00B23	
R355	Blue Bias	2000	EVN49AA00B23	
R356	Green Bias	2000	EVN49AA00B23	
R357	Blue Drive	300	EN49AA00B32	
R358	Red Drive	300	EVN49AA00B32	
R453	Vertical Height	30K	EVN60AA00B34	
R524	Horizontal Cent	200	EVND4AA00B22	
# R555A	Focus	---	(1)	
# R555B	Screen	---	(1)	
R619	Sub Tint	5000	EVND4AA00B53	
R760	Horiz-Width	5000	EVND4AA00B53	
R761	Parabola Amp	10K	EVND4AA00B14	
R2200	Input Leel	10K	EVN60AA00B14	
R2209	L-R Level	10K	EVND4AA00B14	
R2213	Separation	5000	EVND4AA00B53	
R2220	VCO Adjust	50K	EVND4AA00B54	
R2221	Filter Adjust	20K	EVND4AA00B24	

(1) Part of Horizontal Output Transformer #T551 PN TLF15544F

For Safety use only Equivalent Replacement Parts.

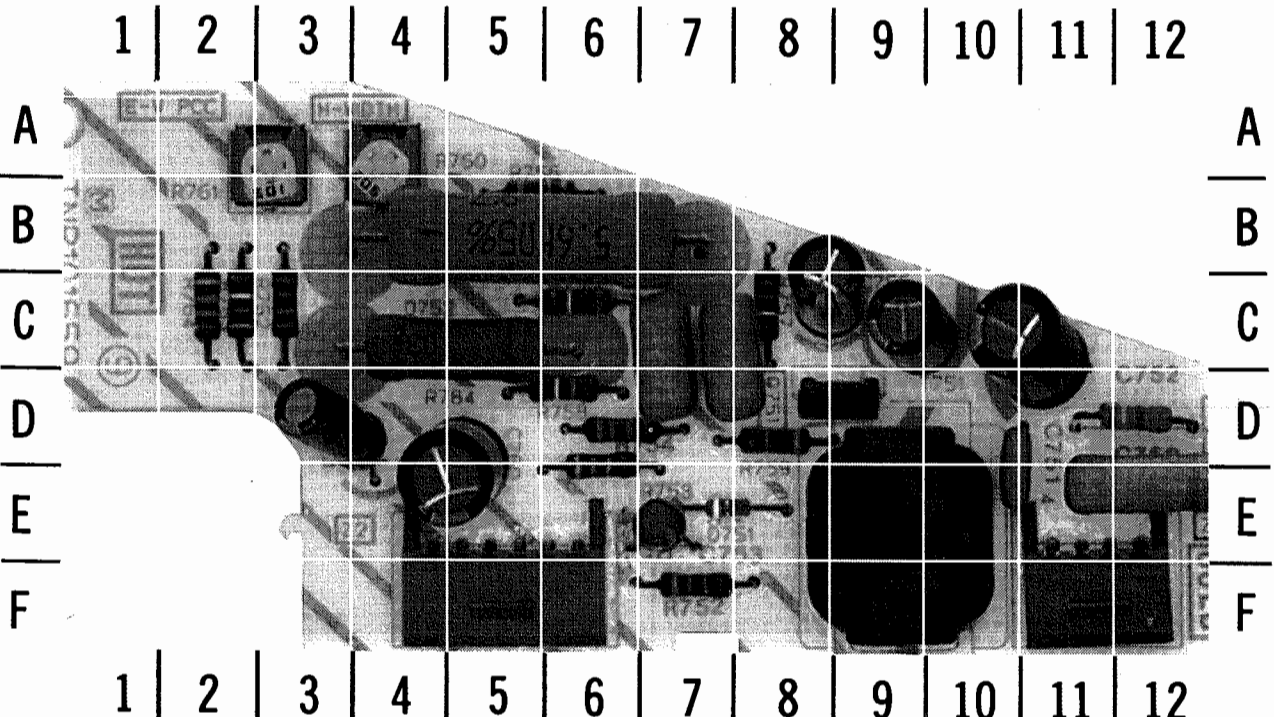


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STEREO/SAP BOARD

STEREO-SAP BOARD-GridTrace Location Guide

C2200	E-12	R2202	F-12	R2245	E-7
C2201	D-13	R2203	F-13	R2246	F-8
C2202	A-9	R2204	F-13	R2248	D-8
C2203	B-9	R2205	D-13	R2253	D-9
C2204	A-9	R2207	A-8	R2254	D-13
C2205	A-11	R2208	A-9	TPE1	D-13
C2206	C-13	R2209	A-8	TPE10	D-11
C2207	B-13	R2210	A-10	TPE11	E-11
C2208	A-11	R2211	B-13	TPE21	C-12
C2209	B-13	R2212	A-11		
C2210	B-13	R2213	A-12		
C2211	B-13	R2215	D-12		
C2212	A-10	R2216	E-12		
C2213	A-11	R2217	E-11		
C2214	B-13	R2218	D-18		
C2215	D-11	R2219	D-10		
C2219	D-9	R2220	D-10		
C2223	D-9	R2221	D-11		
C2224	E-13	R2222	D-11		
D2201	B-7	R2228	F-8		
E1	F-4	R2229	C-7		
E2	F-11	R2231	D-8		
E3	F-10	R2232	D-8		
IC2200	B-10	R2234	E-8		
Q2201	D-13	R2235	E-8		
Q2203	C-8	R2236	E-9		
R2200	E-13	R2238	D-10		



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PINCUSHION BOARD

PINCUSHION BOARD-GridTrace Location Guide

C751	D-10
C752	C-11
C753	E-7
C754	C-7
C755	C-7
C756	C-9
C757	B-8
C758	E-12
C760	E-5
C761	D-4
D751	E-7
D752	C-4
D753	B-5
Q751	D-8
R751	D-12
R752	F-7
R753	E-6
R754	D-6
R755	C-6
R756	A-6
R757	C-8
R758	D-6
R759	D-8
R760	A-4
R761	A-3
R762	C-3
R763	C-2
R764	C-2
R769	B-5
T751	E-9
Z1	F-12
Z2	F-6

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

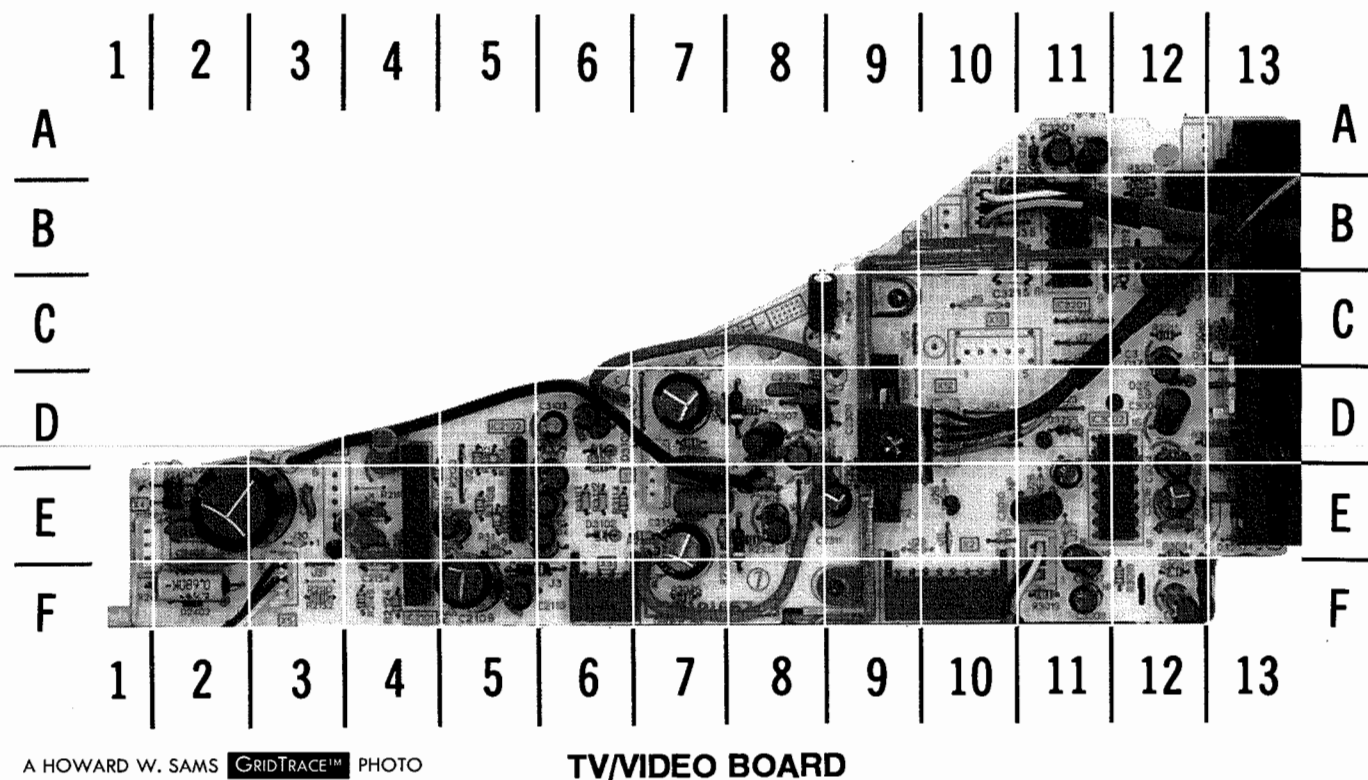
SEMICONDUCTORS (Select replacement for best results)

	ITEM No.	MFR TYPE No.	MFR PART No.	NTE PART No.	ECG PART No.	TCE PART No.
#	IC101	AN5160NK				
	IC451	AN5160NK-N LA7836 LA7836-TV				
#	IC551	AN78M12 AN78M12LB		NTE966 NTE966	ECG966 ECG966	SK3592 SK3592
#	IC801	STR3230	TVSSTR3230			
	IC2101	AN5836		NTE1780	ECG1780	SK9731
	IC2102	M5218L	TVSM5218L	NTE778S	ECG778S	
	IC2200	CXA1124AS				
	IC2301	AN7158N		NTE1373	ECG1373	SK4822
	IC3002	M52055P				
	IC3201	M52055P				
	Q001	2SC1685R		NTE85	ECG85	SK9229
		2SC1685QR		NTE85	ECG85	SK9229
	Q002	2SA564AR		NTE290A	ECG290A	SK3932
		2SA564AQR		NTE290A	ECG290A	SK3932
	Q004	2SC1685R		NTE85	ECG85	SK9229
		2SC1685QR		NTE85	ECG85	SK9229
	Q005	2SA564AQ		NTE290A	ECG290A	SK3932
		2SA564AQR		NTE290A	ECG290A	SK3932
	Q006,7,	2SC1685R		NTE85	ECG85	SK9229
		2SC1685QR		NTE85	ECG85	SK9229
	Q019	2SC1685R		NTE85	ECG85	SK9229
		2SC1685QR		NTE85	ECG85	SK9229
	Q102	2SA564AQ		NTE290A	ECG290A	SK3932
		2SA564AQR		NTE290A	ECG290A	SK3932
	Q301	2SC1685QR		NTE85	ECG85	SK9229
	Q303	2SA719R		NTE290A	ECG290A	SK3114A
		2SA719QR		NTE290A	ECG290A	SK3114A
	Q304	2SC1685Q		NTE85	ECG85	SK9229
		2SC1685QR		NTE85	ECG85	SK9229
	Q316	2SC1685R		NTE85	ECG85	SK9229
		2SC1685QR		NTE85	ECG85	SK9229
	Q321 - Q325	2SD637-Q		NTE16	ECG16	SK9664
		2SD637Q		NTE16	ECG16	SK9664
	Q351,52,53	2SC3063		NTE157	ECG157	SK3747
		2SC3063RL		NTE157	ECG157	SK3747
	Q451	2SC1685R		NTE85	ECG85	SK9229
		2SC1685QR		NTE85	ECG85	SK9229
	Q454	2SA564AQ		NTE290A	ECG290A	SK3932
		2SA564AQR		NTE290A	ECG290A	SK3932
	Q501	2SC4212(H)				
		2SC2653(H)CL		NTE198	ECG198	SK3220
		2SC4212HLB				
		2SC4212H				
#	Q531	2SC1685R		NTE85	ECG85	SK9229
		2SC1685QR		NTE85	ECG85	SK9229
#	Q532	2SA564AQ		NTE290A	ECG290A	SK3932
		2SA564AQR		NTE290A	ECG290A	SK3932
#	Q533	2SC1685R		NTE85	ECG85	SK9229
		2SC1685QR		NTE85	ECG85	SK9229
	Q541	2SC1685R		NTE85	ECG85	SK9229
		2SC1685QR		NTE85	ECG85	SK9229

SEMICONDUCTORS (Select replacement for best results)

	ITEM No.	MFR TYPE No.	MFR PART No.	NTE PART No.	ECG PART No.	TCE PART No.
#	Q551	2SD2057				
	Q601,2,3,4	2SD2057LB				
		2SC1685R		NTE85	ECG85	SK9229
		2SC1685QR		NTE85	ECG85	SK9229
	Q751	2SD637-Q		NTE16	ECG16	SK9664
		2SD637PQR		NTE16	ECG16	SK9664
		2SC1685PQR		NTE85	ECG85	SK9229
	Q752	2SA564AQR		NTE290A	ECG290A	SK3932
	Q753	2SD1266Q		NTE377	ECG377	SK9112
		2SD1266LB		NTE377	ECG377	SK9112
		2SD1266		NTE377	ECG377	SK9112
	Q2201,3	2SD637-Q		NTE16	ECG16	SK9664
		2SD637Q		NTE16	ECG16	SK9664
	Q3102,3	2SC1685R		NTE85	ECG85	SK9229
		2SC1685QR		NTE85	ECG85	SK9229
	Q3104	2SA564AQ		NTE290A	ECG290A	SK3932
		2SA564AQR		NTE290A	ECG290A	SK3932
	Q3105	2SC1685R		NTE85	ECG85	SK9229
		2SC1685QR		NTE85	ECG85	SK9229
	Q3216	2SD637-R		NTE16	ECG16	SK9664
		2SD637R		NTE16	ECG16	SK9664
	Q3255	2SD637-Q		NTE16	ECG16	SK9664
		2SD637Q		NTE16	ECG16	SK9664

For SAFETY use only equivalent replacement part.



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TV/VIDEO BOARD

TV/VIDEO BOARD-GridTrace Location Guide

C2109	F-5	D3257	E-13	S3200	B-12
C2110	E-4	D3258	D-13	X1	E-7
C2111	D-4	D3259	D-12	X2	F-10
C2112	D-6	IC2101	E-4	X3	F-6
C2113	F-6	IC2102	E-5	X4	F-1
C2147	E-5	IC2301	D-9	X5	F-3
C2152	E-3	IC3002	E-12	X7	E-11
C2153	E-4	IC3201	B-11	X11	B-10
C2154	F-4	J3200	B-13	X12	D-10
C2301	D-8	P3000	C-13		
C2302	E-9	P3001	D-13		
C2303	E-7	P3002	E-13		
C2304	D-7	R2119	E-4		
C2305	D-8	R2120	E-4		
C2306	E-8	R2121	F-5		
C2307	D-8	R2124	F-4		
C2308	E-8	R2149	F-4		
C2309	D-8	R2152	F-3		
C2310	D-8	R2156	F-5		
C2311	E-9	R2301	D-6		
C2312	E-7	R2302	E-8		
C2313	E-9	R2303	E-7		
C2314	E-7	R2304	E-9		
C2402	E-2	R2305	D-7		
C2403	E-2	R2306	E-8		
C2405	E-2	R2307	D-7		
C2406	E-2	R2308	E-7		
C2410	E-2	R2309	E-8		
C3004	D-12	R2310	E-7		
C3007	F-11	R2311	D-8		
C3008	F-11	R2312	E-8		
C3009	E-11	R2403	F-2		
C3010	E-11	R3018	F-12		
C3013	E-12	R3019	F-11		
C3014	E-12	R3032	D-13		
C3015	F-12	R3033	E-12		
C3016	C-12	R3034	E-12		
C3017	C-12	R3035	F-12		
C3103	E-6	R3040	C-12		
C3104	E-6	R3046	F-7		
C3117	E-6	R3051	C-13		
C3118	E-6	R3101	E-5		
C3201	A-11	R3104	D-5		
C3206	C-12	R3105	D-6		
C3207	A-11	R3106	E-5		
C3208	C-12	R3107	E-4		
C3209	B-11	R3108	E-5		
C3214	C-12	R3109	E-5		
C3215	E-11	R3110	E-6		
D2401	F-2	R3111	E-6		
D2402	F-2	R3112	E-6		
D2403	E-2	R3113	E-6		
D2404	E-2	R3114	E-6		
D3101	E-6	R3201	A-11		
D3102	E-6	R3202	C-13		
D3253	E-11	R3203	B-12		
D3254	A-11	R3211	C-12		
D3255	D-11	R3212	C-12		
D3256	E-13	R3220	B-12		

MISCELLANEOUS

ITEM No.	DESCRIPTION	MFGR PART No.	NOTES
# CRA801	Capristor	EXNG131P155	130pf/1.5M
# F001	Fuse 4Amp 125VAC	XBA1F40NU100	Slow Blow
L010	Ferrite Bead	EXCELSA24T	
L109	Ferrite Bead	EXCELSA35B	
# L555	Ferrite Bead	EXCELSA24B	
# L556	Ferrite Bead	EXCELSA24B	
L558	Ferrite Bead	EXCELSA24B	
L559	Ferrite Bead	EXCELSA24B	
L561	Ferrite Bead	EXCELSA24T	
L562	Ferrite Bead	TSC910	
L563	Ferrite Bead	TSC910	
L564	Ferrite Bead	TSC910	
L565	Ferrite Bead	TSC910	
# L801	Choke,AC Line	ELF18D650A	
# L804	Degaussing	OLK19020	
P800	Cord, AC Line	TSX5140X	
		TSX3134X	
# RL001	Relay	TSE1864	
S050	Switch	EVQQVC13T	Power
S051	Switch	EVQQV13T	Volume
S052	Switch	EVQQV13T	Volume
S053	Switch	EVQQV13T	Channel
S054	Switch	EVQQV13T	Channel
S055	Switch	EVQQV13T	NORM
S057	Switch	EVQQV13T	Display
S058	Switch	EVQQV13T	Set Up
S059	Switch	EVQQV13T	Video Function
S060	Switch	EVQQV13T	TV/Video
S062	Switch	EVQQV13T	Notch
S063	Switch	ESB64613	CATV
S2301	Switch	ESD1512250	Speaker
S3001	Switch	ESD1512250	S-VHS (1)
S3200	Switch	-----	S-Video
# V1	CRT	M68JUA99X	
X001	Crystal,Oscillator	TSS2077MX	
X101	Saw	EFCH45MVK12N	Filter
X102	Trap	EFCS4R5MW3BA	4.5MHZ
X201	Filter,BandPass	EFCS4R5MS4W	4.5MHZ
X501	Crystal,Oscillator	EFOA503KS41	
X601	Crystal,Oscillator	TSS816MX	3,58MHZ
	Holder	TJC6319	For Fuse
	Socket	TJS1A5050	For CRT

(1) May Be Found in Some Versions.

For Safety use only Equivalent Replacement Parts.

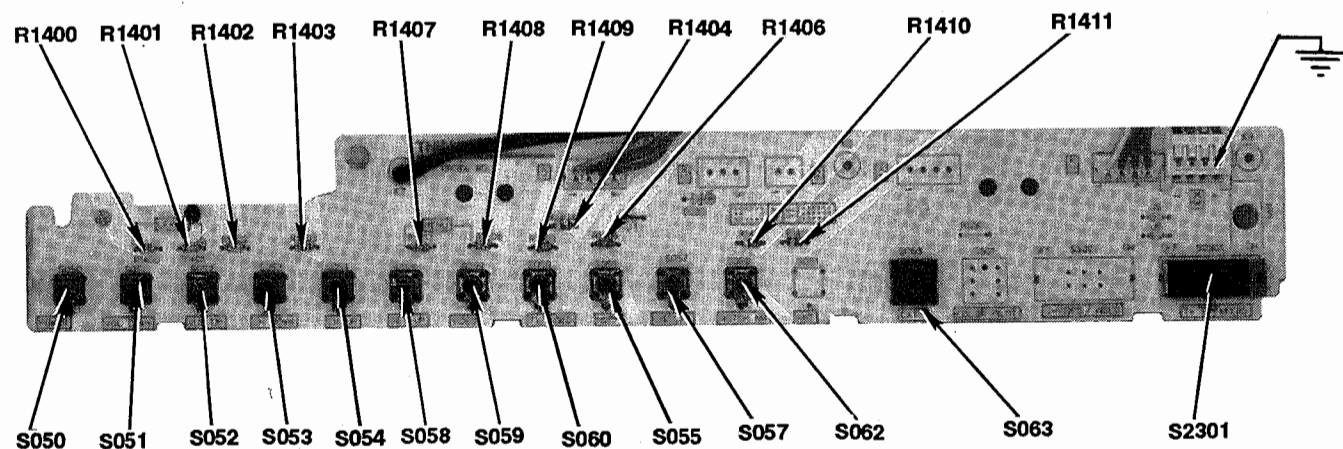
SPEAKERS

ITEM No.	TYPE	REPLACEMENT DATA		NOTES
		MFGR PART No.	QUAM PART No.	
SP1/SP2	3" x 5" 8 ohms PM	EAS12P128EG	----	Used in Models CTM-277SS, CTM-2776S, CTM-2778S Used in Model CTM-2771S only Used in Model CTM-2781S only Used in Model CTM-2770S only
	3" x 5" 8 ohms PM	EAS12D113CG	35A2Z8	
	5" x 7" 8 ohms PM	EAS18D39TA	57C3Z8	
	4 1/2" Round 8 Ohms	EAS12D248CG	5C3Z8	

CABINETS & CABINET PARTS (When ordering specify model, chassis and color.)

ITEM	PART No.	ITEM	PART No.
Assembly,Escutcheon	TxFKE060SER	Foot, Cabinet Left	TKR27981
Assembly,Cabinet Front	TXFKY020SER	Foot, Cabinet Right	TKR27991
Assembly,Cabinet Back	TXFKU629SER	Grille,Speaker	TKP1757902
Cabinet Back	TKU2A10901	Overlay	TKP1811891
Door, Control	TKP1811881		

PANASONIC
MODEL CTM-2770S (CHASSIS ALEDP182)



CONTROL BOARD-COMPONENT LOCATION

PARTS LIST AND DESCRIPTION

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	MFR TYPE No.	MFR PART No.	NTE PART No.	ECG PART No.	TCE PART No.
D001,4	MA165	TVSQA205D	NTE519	ECG519	SK3100
D005	QA205D		NTE5010A	ECG5010A	SK5A1
D020	MA165		NTE519	ECG519	SK3100
D021	MA27TA		NTE605A	ECG605A	SK7952
D022	MA161		NTE177	ECG177	SK9091
D027	MA150		NTE177	ECG177	SK9091
D031	AM01Z		NTE116	ECG116	SK3313
	ERA1501		NTE552	ECG552	SK9000
D032	MA162		NTE519	ECG519	SK3100
D034	LN31GPHL		NTE3024	ECG3024	SK2024
	SEL1320G		NTE3167	ECG3167	SK2167
D035	LN21RPHL				
	SEL1120R		NTE3166	ECG3166	SK2166
D302	MA150		NTE177	ECG177	SK9091
D304	MA856		NTE519	ECG519	SK3100
D352	MA165	TVSQA208C	NTE519	ECG519	SK3100
D353	MA4047L		NTE5009A	ECG5009A	SK4A7
D383	MA27WA		NTE605A	ECG605A	SK7952
D451	ERA15-01		NTE552	ECG552	SK9000
D452,53	MA165		NTE519	ECG519	SK3100
D454	MA150		NTE177	ECG177	SK9091
D457	MA4082M		NTE5016A	ECG5016A	SK8A2
D502	QA208C				
# D531	AU01		NTE552	ECG552	SK9000
	AS01		NTE552	ECG552	SK9000
	ERA2204		NTE552	ECG552	SK9000
# D532	MA165		NTE519	ECG519	SK3100
# D533	QA206G	TVSQA206M	NTE5013T1	ECG5013T1	
D542	MA165		NTE519	ECG519	SK3100
# D551	RU2N				
# D552	AU02		NTE552	ECG552	SK9000
# D554	AS01		NTE552	ECG552	SK9000
	AU01		NTE552	ECG552	SK9000
	ERA2204		NTE552	ECG552	SK9000
D555	MA165		NTE519	ECG519	SK3100
D556	MA1360H				
D557	QB105N		NTE135A	ECG135A	SK5V1
# D558	RS3FS				
D559	RU2M		NTE552	ECG552	SK9000
D560	QB109SA				
D603	MA150	TVSRU2M	NTE177	ECG177	SK9091
D751	MA150		NTE177	ECG177	SK9091
D752	QA228B		NTE5034A	ECG5034A	SK28A
D753	MA1300M		NTE5035A	ECG5035A	SK30A
# D801 - D804	RM11B		NTE125	ECG125	SK3081
	ERC1208		NTE125	ECG125	SK3081
D806	ERPWSB0M050D				
D2201	QB109SA				
D2401 - D2404	ERA1502		NTE552	ECG552	SK9000
	ERA15-02		NTE552	ECG552	SK9000
D3101,2	MA165		NTE519	ECG519	SK3100
D3253 - D3259	MA4110		NTE5020A	ECG5020A	SK11A
IC001	MN15151Q14A				
IC002	MN1280R		NTE15044		SK9854

PANASONIC
MODEL CTM-2770S (CHASSIS ALEDP182)

COILS (RF-IF)

ITEM No.	RATING	MFGR PART No.	ITEM No.	RATING	MFGR PART No.
L006	Peaking (5.6uH)	TLUABTA5R6K	L202	Peaking (4.7uH)	TLUABTA4R7K
L007	Peaking (5.6uH)	TLUABTA5R6K	L304	Comb Filter	TLK153152
L008	Peaking (5.6uH)	TLUABTA5R6K	L354	RF Choke (150uH)	TLUABTA151K
L011	RF Choke (1.0uH)	TLUABTA1R0K	# L551	Liearity	TLH6618P
L103	AFT	TLI67394-1	# L751	Pincushion	TLH15727
L104	Peaking (1.2uH)	TLQ012K205C	L3201	Peaking (82uH)	ELEPH820JA
L105	VCO	TLI58755	L3205	Peaking (12uH)	TLUABTA120K
L106	Peaking (15uH)	TLUABTA150K	L3207	RF Choke (39uH)	ELEPH390JA
L108	Peaking (1.2uH)	TLQ012K205C	# T2401	Audio Power	ETP48EU28B
L201	Quadrature	EIS1EG011B			

For Safety use only Equivalent Replacement Parts.

COILS & TRANSFORMERS

ITEM No.	FUNCTION	MFGR PART No.	OTHER IDENTIFICATION	NOTES
# L570	YOKE 110° Horiz 1.02mh Vert 25.8mh	TLY15460F OLY15407F(2)	TLY15460F (1) OLY15407F (1)	
# L551	Linearity Coil	TLH66188P TLH6663P (2)	TLH66188P (1) TLH6663P (1)	
# T001	Power Supply Transformer	TLP16297	TLP16297 (1)	
# T501	Horizontal Driver	TLH15452	TLH15452 (1)	
# T502	Horizontal Coupling	ETE19Z30AY	ETE19Z30AY(1)	
# T551	Horizontal Output	TLF15544F	TLF15544F (1)	
# T751	Pincushion	ETE16Z37AY	ETE16Z37AY(1)	
# T2401	Audio Power	ETP48EU28B	ETP48EU28B(1)	

For Safety use only Equivalent Replacement Parts.
(1) Number on Unit.
(2) Used in Models with AED182 Chassis

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA		
		MFGR PART No.	NTE PART No.	
# D806	136.3 Cold Tap 5.3	ERPW5B0M050D	---	
R050	10K 1% 1/4W Mtl Flm	EROS2CKF1002	---	
R051	10K 1% 1/4W Mtl Flm	EROS2CKF1002	---	
# R477	1000 5% 1/4W Carb Flm	ERDS2TJ102	QW210	
# R509	3900 5% 2W Mtl Flm	ERG2ANJ392	2W239	
# R510	3600 5% 3W Mtl Flm	ERG3SJS362	3W236	
# R511	3600 5% 3W Mtl Flm	ERG3SJS362	3W236	
# R531	47 5% 1/4W Cbn Flm	ERD25F470	QW047	
# R532	24.9K 1% 1/4W Mtl Flm	EROS2CKF2492	----	
# R533	10.2K 1% 1/4W Mtl Flm	EROS2CKF1022	----	
# R534	680K 5% 1/4W Cbn Flm	ERDS2T684	QW468	
# R536	820 5% 1/4W Cbn Flm	ERDS2TJ821	QW182	
# R537	18K 5% 1/4W Cbn Flm	ERDS2TJ183	QW318	
# R538	8200 5% 1/4W Cbn Flm	ERDS2TJ822	QW282	
# R539	15K 5% 1/4W Cbn Flm	ERDS2TJ153	QW315	
# R551	1 5% 1W Fusible	ERQ1CJP1R0	F1W1DO	
# R552	1.8 5% 1/2W Fusible	ERQ12HJ1R8	----	
# R558	1.3 5% 1W Fusible	ERQ1CJP1R3	F1W1D3	
R559	68 5% 3W Mtl Flm	ERG3ANJ680	3W368	
# R565	820 5% 2W Fusible	ERQ2CJP821	F2W182	
# R569	27 5% 2W Mtl Flm	ERG2ANJ270	2W027	
# R580	680 5% 5W Mtl Flm	ERG5ZJ681	----	
R768	10 5% 2W Fusible	ERQ2CJP100	F2W010	
R769	5600 5% 3W Mtl Flm	ERG3ANJ562	3W256	
# R801	.82 10% 5W WW	ERF5ZKR82	5WD82	
# R802	120 5% 20W WW	ERF20ZJ121	25W112	
# R803	470 5% 5W WW	ERF5ZJ471	5W147	
# R804	220K 5% 1/4W Cbn Flm	ERDS2TJ224	QW422	
# R805	10K 5% 1/2W Cbn Flm	ERDS1TJ103	HW310	
# R807	47 5% 1/4W Cbn Flm	ERD25FJ470	QW047	
# R809	33 5% 1/4W CbnFlm	ERD25FJ330	QW033	
# R810	4.7 10% 5W WW	ERF5ZK4R7	5W4D7	
# R815	2.7M 10% 1/2W Cbn Comp	ERC12ZGK275	HW527	
# R816	1 10% 1/2W WW	ERW12PK1R0	----	
R1411	21K 1% 1/4W Mtl Flm	EROS2CKF2102	----	
R2210	43K 1% 1/4W Mtl FLm	EROS2CKF4302	----	
R2222	44.2K 1% 1/4W Mtl Flm	EROS2CKF4422	----	
R2238	47K 1% 1/4W Mtl Flm	EROS2CKF4702	----	
R2403	.68 10% 1/2W Fusible	ERQ12HKR68	----	

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